Mathematics
Grade: 8
Basic Teaching

WCP

MATHEMATICS 8

LEARNING FACILITATOR'S MANUAL

Distance Learning

Alberta EDUCATION

Modules 1–6

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Mathematics 8

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LEARNING FACILITATOR'S MANUAL

NOTE: This Mathematics 8 Learning Facilitator's Manual contains the Final Test and answers to the Final Test and to the teacher-assessed assignments; therefore, teachers should at all times keep it secure against unauthorized student access. The Final Test should be accessible to students only in supervised situations.

Mathematics 8
Learning Facilitator's Manual
Modules 1–6
Learning Technologies Branch
ISBN 0-7741-1322-7

This document is intended for	
Students	
Teachers	✓
Administrators	
Parents	
General Public	
Other	

You may find the following Internet sites useful:

- Alberta Education, **http://ednet.edc.gov.ab.ca**
- Learning Technologies Branch, **http://ednet.edc.gov.ab.ca/ltb**
- Learning Resources Distributing Centre, **http://ednet.edc.gov.ab.ca/lrdc**

The use of the Internet is optional. Exploring the electronic information superhighway can be educational and entertaining. However, be aware that these computer networks are not censored. Students may unintentionally or purposely find articles on the Internet that may be offensive or inappropriate. As well, the sources of information are not always cited and the content may not be accurate. Therefore, students may wish to confirm facts with a second source.

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Teachers

Register with the Learning Technologies Branch

The Learning Technologies Branch is dedicated to upgrading and continually improving your Learning Facilitator's Manual so that it accurately reflects any necessary revisions we have had to make in the Student Module Booklets, Assignment Booklets, or the sample Final Test. The types of revisions that will be made are those that make the course more accurate, more current, or more effective.

LTB will send you the **latest enhancements** or **minor upgrades** for your Learning Facilitator's Manual if you return the following registration card to: Learning Technologies Branch, Box 4000, Barrhead, Alberta T7N 1P4, Attention: Instructional Design and Development.

LTB Learning Facilitator's Manual
Registration Card

First Name	Surname
School Name	School Phone Number
School Address	
City	Postal Code
Course Title	Approximate Date of Purchase

You can help ensure that distance learning courseware is of top quality by letting us know of areas that need to be adjusted. Call the Learning Technologies Branch, free of charge by dialling 310-0000, and ask for the Editing Unit. Also, a teacher questionnaire has been included at the back of most Learning Facilitator's Manuals. Please take a moment to fill it out.

We look forward to hearing from you!

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Introduction

A survey of these course materials will confirm that this learning package has been specially designed for many kinds of teachers working in a variety of situations.

In Which Category Do You Fit?

- ❑ Small Schools Teacher
  - ❑ inexperienced
  - ❑ experienced, but in other subject areas
  - ❑ experienced in teaching Mathematics 8, but wanting to try a different approach
- ❑ Distance Learning Teacher
  - ❑ travelling to schools within the region
  - ❑ using facsimile and teleconferences to teach students within the region
- ❑ Large Schools Teacher
  - ❑ inexperienced
  - ❑ experienced in teaching Mathematics 8, but wanting to try a different approach

Because these materials have been created by experienced classroom teachers and distance learning specialists, they have many advantages for students and teachers, regardless of the situation.

Advantages for Students

Materials

- incorporate a strong learner-centred philosophy
- promote such qualities in the learner as autonomy, independence, and flexibility
- are developed through media that suit the needs and circumstances of the learner
- reflect the experiential background of Alberta students
- provide opportunities by overcoming barriers that result from geographical location
- promote individualized learning, allowing learners to work at their own pace

Advantages for Teachers

Materials

- allow teachers maximum teaching time and minimize preparation time
- include different routes through the materials to suit different learners
- incorporate a wide range of teaching strategies, in particular those using independent and individual learning
- deliver curriculum designed by education specialists that reflects the Alberta Education Program of Studies with an emphasis on Canadian content
- provide learning materials that are upwardly compatible with advanced educational technology

Does this learning package sound like something you could use?

This Learning Facilitator's Manual begins with an overview of the current Alberta Education Program of Studies for Mathematics 8. This summary is included for inexperienced teachers or those teachers who have found themselves teaching Mathematics 8 when their training is in other subject areas. This brief description is not meant to replace the Alberta Education Program of Studies, but rather to help teachers confirm the highlights of the program.

Other parts of this introduction have also been included to help teachers become familiar with this learning package and determine how they might want to use it in their classrooms.

Beyond the introduction, the guide itself contains answers, models, explanations, and other tips generated by the teachers who authored this course.

The Student Module Booklets, Assignment Booklets, and LFMs are the products of experienced classroom teachers and distance learning specialists. It is the hope of these teachers that their experience can be shared with those who want to take advantage of it.

Overview of the Program of Studies

The distance learning materials for Mathematics 8 reflect the beliefs, goals, and expected student outcomes of the document *Common Curriculum Framework for K–12 Mathematics: Western Canadian Protocol for Collaboration in Basic Education* (The Common Framework), which provides the basis for the programs of study in Alberta, British Columbia, Manitoba, Northwest Territories, Saskatchewan, and the Yukon. An overview of the Common Framework is provided here for your convenience; however, it is recommended that you obtain a copy of this document. (You may download a copy from Alberta Education's home page on the Internet. Go to **http://ednet.edc.gov.ab.ca** and select "Students & Learning." Then select "Western Canadian Protocol for Collaboration in Basic Education." Select "Mathematics K–9 Framework." Finally, select "Grade 8 Math.")

The Common Framework reaffirms the belief that students are active learners who have had varying experiences and who hold different views about mathematics and life. Students need to explore, communicate and reason mathematically, and construct their own meaning of mathematics. Students need numerous and varied experiences in order to appreciate the usefulness of mathematics and to view mathematics as an integrated whole. Moreover, it is important that learning activities proceed from the concrete to the abstract and from the simple to the complex.

The collaborating provinces and territories agree that mathematics education must prepare students to solve problems, communicate and reason mathematically, and appreciate and value mathematics. In order to function effectively in this technological age, students must become familiar with calculators and computers. It is important that students develop a positive attitude toward mathematics and have a base of knowledge and skills related to all aspects of mathematics.

The Common Framework is stated in terms of outcomes. These outcomes are measurable and identify what the students are expected to know and do. The outcomes for the entire Kindergarten to Grade 12 framework are organized within four strands: Number, Patterns and Relations, Shape and Space, and Statistics and Probability. The student outcomes incorporate seven mathematical processes: communication, connections, estimation and mental math, technology, problem solving, reasoning, and visualization. The outcomes are also influenced by the nature of mathematics and such recurring themes as shape, dimension (size and scale), number, quantity, pattern, relationships, uncertainty, constancy, and change.

Suggested Time Allotments

Considerable time should be spent on the concepts and processes identified within each strand. The following chart outlines the suggested time allotments for mathematics in grades 5 to 9.

The time allotment will vary from grade to grade. For example, more time will be spent on the number strand in Mathematics 7 than in Mathematics 9, and less time will be spent on Shape and Space in Mathematics 7 than in Mathematics 8.

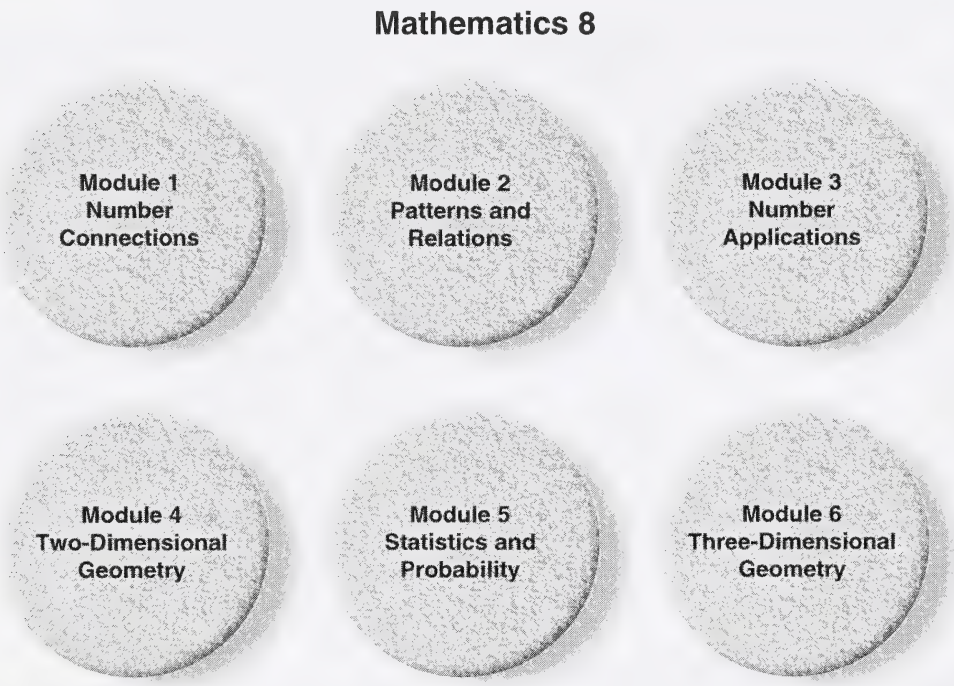
Mathematics in Grades 5 to 9

Strand	Time (%)
Number	25–35
Patterns and Relations	20–30
Shape and Space	20–30
Statistics and Probability	15–25

The Common Framework emphasizes that concepts need to be developed gradually; concepts should be introduced using manipulatives, and developed from the concrete to the pictorial to the symbolic. Moreover, a minimum of half of the available time within all strands needs to be dedicated to the mathematical processes of communication, connections, estimation and mental math, technology, problem solving, reasoning, and visualization. Further, there should be a balance between estimation and mental math, paper-and-pencil exercises, and the appropriate use of calculators and computers.

Overview of Mathematics 8

The distance learning materials have been designed to provide students with the opportunity to meet the expected student outcomes specified in the Common Framework.



Concepts are carefully developed and learning aids are frequently used to help students visualize the concepts. The various mathematical processes identified in the Common Framework are stressed. For example, the problem-solving process is described in the beginning of each Student Module Booklet, many problem-solving strategies are demonstrated in the Appendix of Module 6, and there are problem solving opportunities in each activity. Also, connections are made with the everyday world and with previously developed skills and knowledge.

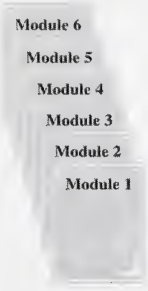
Every attempt has been made to give students a variety of activities and to make mathematics real and interesting. Videos, learning aids, games, and technology are integrated to cater to learning-style preferences of individual students. Therefore, this distance learning course is more than a textbook; it is a complete learning package.

Structure of the Learning Package

Basic Design

This learning package involves many other components in addition to the Learning Facilitator's Manual. A survey of the components will show you that the course is divided into clumps of learning called modules. For each module there are two print components: a Student Module Booklet and an Assignment Booklet.

Student Module Booklets



Student Module Booklets contain guided activities that instruct students in a relevant, realistic setting.

These booklets have been specially designed to promote such qualities in the learner as autonomy, independence, and flexibility. Writers have incorporated such teaching strategies as working from the concrete to the abstract, linking the old to the new, getting students actively involved, and using advance, intermediate, and post organizers. Many other techniques are used to cater to individual learning styles and preferences. The materials have been designed to include a variety of pathways and options because they are intended for a broad range of use within and beyond Alberta.

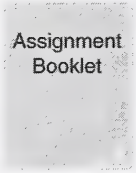
Contents
Overview Evaluation
Section 1 Activity 1 Activity 2 etc.
Section 2 Activity 1 Activity 2 etc.
Module Summary
Appendix

The structure of the Student Module Booklets follows a systematic design. Each booklet begins with a detailed table of contents that shows the students all of the main steps; this page acts as an organizer for students. The Module Overview introduces the module topic or theme and includes a graphic representation to help visual learners and poor readers. This introduction also includes an evaluation statement, so students are informed of the weightings of each assignment.

The body of the Student Module Booklet is made up of two or more closely related sections. Each section contains student activities that develop skills and knowledge centred around a theme. The activities may include print, audio, video, computer, or Internet involvement. Computer and Internet activities are optional. At times, the student and the learning facilitator are allowed to choose the activity that best suits the student's needs and interests. Each section also includes other activities such as the Extra Help and Enrichment as optional pathways. This flexibility caters to each student's personal situation.

Following the last section is a modular summary that focuses on the skills and strategies that the student has learned. The Student Module Booklet ends with an Appendix that includes a Glossary and Suggested Answers for the self-assessment work.

Assignment Booklet

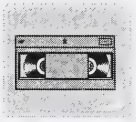


Accompanying each Student Module Booklet is an Assignment Booklet. The activities in the Assignment Booklets can be used for both formative and summative assessments. Students should complete these assignments when they have thoroughly reviewed the other module materials. You may decide to have students submit their work as soon as they have completed each sectional assignment or you may choose to let students complete all the sectional assignments within the module before evaluating their work. The Assignment Booklets have been designed for both in-classroom use and for distance learning. **If the Assignment Booklets are not being mailed, remove the green outside mailing covers before distributing the booklets to students.**

Media

INTERNET

COMPUTER DISK



VIDEOCASSETTE

Internet references are found throughout the course; exploring those references, however, is optional for students. In most cases, students are given suggested topics that they may explore through the Internet's search engines. In rare cases, students might be given a specific uniform resource locator (URL), but they should be aware that these addresses are subject to change.

Updated information about the Learning Technologies Branch and this course and others can be found by starting at the Learning Technologies Branch's home page at **http://ednet.edc.gov.ab.ca/ltb/** or by going straight to the LTB Courses page at **http://ednet.edc.gov.ab.ca/ltb/400/courses.html**.

There are also activities in this course that require students to view videos. These mandatory videos are listed on the following pages. It is important that you acquire these videos so students have access to them when needed.

This course recommends students to use computer software. A list of the computer software appears on the following pages. It is important that you acquire the software so that students have access to them when needed. (If students do not have access to a computer, they will have to do the calculations using paper-and-pencil methods or a calculator.)

Materials, Media, and Equipment

Mandatory Components

Equipment (Hardware)	Media	Materials
• videocassette player • scientific calculator • mathematical instrument set	• Mandatory Video List: –*Math Moves* series: *Adding and Subtracting Fractions*, *Multiplying and Dividing Fractions*, *Equations: Solving with One Step*, *Equations: Solving with More than One Step*, *Number Theory* –*Mathways* series: *The Percent*, *Areas (of Circles and Cylinders)*, and *Volumes*	• LFM for Mathematics 8 • one complete set of Student Module Booklets (6) and Assignment Booklets (6) for each student • There is a Final Test.

Video programs used in this course may be available from your regional library service. If not, you can obtain the videos from the following source:

- ACCESS—The Education Station
  Learning and Skills Television of Alberta Ltd.
  3720 – 76 Ave.
  Edmonton, Alberta
  T6B 2N9
  Tel: (403) 440-7777 (inside Edmonton)
  1-800-252-9363 (outside Edmonton)
  Fax: (403) 440-8899
  Internet: **http://www.accesstv.ab.ca**

A compilation tape for this course is available from the following source:

- Learning Resources Distributing Centre
  12360 – 142 St.
  Edmonton, Alberta
  T5L 4X9
  Tel: (403) 427-5775
  Fax: (403) 422-9750
  Internet: **http://www.lrdc.edc.gov.ab.ca/**

Optional Components

Equipment (Hardware)	Media	Materials
• computer	• Optional Computer Software List: – a browser such as *Netscape*™ to access the Internet – a spreadsheet program such as *ClarisWorks*™ – a Logo program such as *Logo PLUS*™ *for the Macintosh*® or *PC Logo*™ from Terrapin Software, Inc. – *Understanding Fractions* from the series *Understanding Math*	• assorted materials

Computer software used in this course may be available from your regional library service or local computer software retailers. If not, the Learning Resources Distributing Centre can provide information on distributors.

You may also find information regarding the software on the Internet. Software sites may include up-to-date program information, resource information, demonstrations, and programs available for downloading.

Other Materials

There are no response spaces provided in the Student Module Booklets for Mathematics 8; this means students will need a binder with loose-leaf and graph paper for responses. They will also need a scientific calculator with a fraction key and a mathematical instrument set (compass, metric ruler, plastic triangles, and protractor). As well, students will need a variety of supplies such as heavy paper (card stock), standard dice, standard playing cards, scissors, glue, coloured pencils or felt pens, and cellophane tape.

Blackline masters for many of the learning aids referred to in Mathematics 8 are provided in several of the Student Module Booklets. You may laminate photocopies of these pages, or you may prefer to provide students with some of the following manipulatives that are commercially available: pattern blocks, two colours of base ten blocks, bingo chips or checkers, and tangrams.

Instructions are given for making some of the other learning aids referred to in Mathematics 8. For example, students can make a spinner from a paper clip and sharpened pencil.

Using This Learning Package in the Classroom

Conventional Classroom

Whether your classroom has desks in rows or tables in small groups, you may be most comfortable with a learning system that you can use with all your students in a paced style. In other words, you may want a package that will suit all of your students, so they can move through the materials as one group or several small groups. Because these materials contain different routes or pathways within each module, they can address various learning styles and preferences. The materials also include many choices within the activities to cater to different thinking levels and ability levels. Because of their versatility and flexibility, these materials can easily suit a conventional classroom.

Open Learning Classroom

Open learning is the concept of opening up opportunities by overcoming barriers of time, pace, and place by giving the learners a package specially designed to enable them to learn on their own for at least some of the time.

Such a concept is not new. Many teachers can recite attempts to establish an individualized learning system as they recognized the importance of trying to personalize courseware to meet each individual's needs. But these past efforts often failed because of lack of time and lack of quality materials that conformed to Alberta specifications.

Owing to advanced educational technology and improved Alberta-specific learning packages, a student-centred approach is now possible. Improved technology now allows us to provide support to learners individually, regardless of their pace or location. A teacher cannot be in twenty-eight places at one time offering guidance. Media and a well-designed learning package, however, can satisfy individual needs. Technology can also help provide an effective management system needed to track the students as they progress independently through the materials.

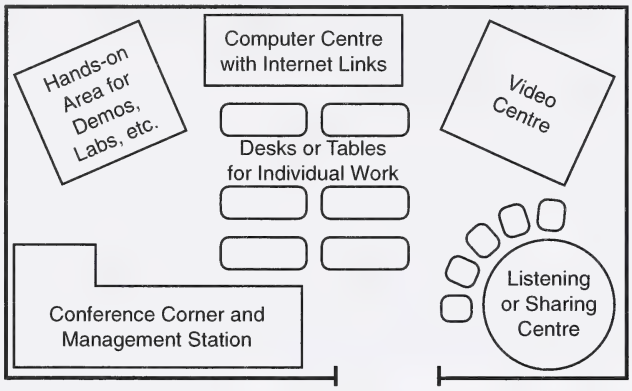
The key to a successful open learning system depends on three vital elements: a learning package specially designed to enable students to learn effectively on their own for at least some of the time; various kinds of learner support; and a management system and style that ensures that the open learning system runs smoothly.

The Key to a Successful Open Learning System

Learning Package

The specially designed learning package needed for a successful open learning system has been developed for you. The objectives teach current Alberta specifications using strategies designed for individualized instruction. As the learning facilitator, you need to be sure to have all of the components in the learning package available to students as needed.

If you are able to acquire media and appropriate hardware to meet your class needs, media centres can be established.


Hands-on Area for Demos, Labs, etc.
Computer Centre with Internet Links
Video Centre
Desks or Tables for Individual Work
Conference Corner and Management Station
Listening or Sharing Centre

You may not have the luxury to have enough hardware to set up a permanent video or computer centre in your classroom. In that case, students should be encouraged to plan ahead. Perhaps every three to five days they should preview their materials and project when they would need a certain piece of media. This would allow you to group students, if necessary, or reserve media as required.

Support

Support is definitely a key element for successful learning, and when you're planning an individualized, non-paced program, you need to carefully plan when and how support will be given.

The materials contain a form of consistent support by providing immediate feedback for activities included in the Student Module Booklet. Students have solutions, models, explanations, and guides included in the Appendix of every booklet. These aids are included so students can receive immediate feedback to clarify and reinforce their basic understanding before they move on to higher levels of thinking.

As the learning facilitator, you may need to offer more support and personal guidance to those students having difficulty. The activities include choices and pathways. If a student is struggling, you may need to encourage that student to work on all of the choices rather than on only one. This would provide additional instruction and practice in a variety of ways.

You may also have to reinforce the need for students to do the sectional activities carefully and thoroughly before attempting the assignments in the Assignment Booklet.

Another form of support is routine contact with each individual. This contact might be achieved with a biweekly conference scheduled by you; or, as students reach a certain point (e.g., after each section is completed), they may be directed to come to the conference area.

Special counselling may be needed to help students through difficult stages. Praise and encouragement are important motivators, particularly for those students who are not used to working independently.

Direct teaching may be needed and scheduled at certain points in the program. This teaching might involve small groups or a large group. It might be used to take advantage of something timely (e.g., election, eclipse), something prescheduled like the demonstration of a process, or something involving students in a hands-on, practical experience.

Support at a distance might include tutoring by phone, teleconferencing, faxing, or planned visits. These contacts are the lifeline between learners and distance education teachers, so a warm dialogue is essential.

Management

Good management of an open learning system is essential to the success of the program. Leadership and promotion of the system are essential. The following areas also need action to ensure that the system runs smoothly:

- Scheduling, Distributing, and Managing Resources—As discussed earlier, in order to do these tasks efficiently you may need to develop media centres or a system for students to reserve the necessary resources.

- Scheduling Students—Students and teachers should work together to establish goals, course completion timelines, and daily timelines. Although students may want to study for long periods of time (e.g., all morning), learning facilitators should discourage this practice. Concentration, retention, and motivation are improved by taking scheduled breaks.

- Monitoring Student Progress—You will need to record the date that each student completes each module and the Final Test. Your data might also include the projected date of completion if you are using a student-contract approach.

Sample of a Student Progress Chart

Mathematics 8		Module 1	Module 2	Module 3	Module 4	Module 5	Module 6	Final Test
Billy Adams	P							
	A							
Louise Despins	P							
	A							
Violet Klaissian	P							
	A							
P = Projected Completion Date A = Actual Completion Date								

The student could keep a personal log as well. Such tracking of data could be stored easily on a computer.

- Recording Student Assessments—You will need to record the marks awarded to each student for work completed in each module Assignment Booklet. The marks from these Assignment Booklets will contribute to a portion of the student's final mark. Other criteria may also be added (a special project, effort, attitude, etc.). Whatever the criteria, they should be made clear to all students at the beginning.

Sample of a Student Assessment Chart

Mathematics 8	Module 1	Module 2	Module 3	Module 4	Module 5	Module 6	Year's Average	Other	Final Test	Final Mark
Billy Adams	67	71	59	60	78	67	67			
Louise Despins	51	47	54	55	52	53	52			
Violet Klaissian	84	77	83	88	85	81	83			

Letter grading could easily be substituted.

- Recording Effectiveness of System—Keep ongoing records of how the system is working. This data will help you in future planning.

Sample of a System Assessment Chart

Module 1			
Date	Student Module Booklet	Assignment Booklet	Resources/Media

The Role of the Teacher in an Open Learning Classroom

The teachers in a conventional classroom spend a lot of time talking to large groups of learners. The situation in open learning requires a different emphasis. Teachers will probably meet learners individually or in very small groups.

With this approach, it is necessary to move beyond the idea of a passive learner depending largely on a continually supportive teacher. The teacher must aim to build the student's confidence, to stimulate the learner into self-reliance, and to guide the learner to take advantage of routes that are most meaningful and applicable to the learner.

These materials are student centred, not teacher centred. The teacher needs to facilitate learning by providing general support to the learner.

Evaluation

Evaluation is important to the development of every learner. In order to identify strengths and weaknesses, both students and teachers need to gather and analyse information and make decisions.

These specially designed learning packages contain many kinds of informal and formal evaluation.

Informal Evaluation

Observation

In the classroom, the teacher has the opportunity to see each student perform every day and to become aware of the level and nature of each student's performance.

Observations are more useful if they are recorded in an organized system. The following list of questions is a sample of types of observations and how they can be collected.

Observation Checklist

	B. Adams	L. Despins	V. Klaissian	H. Smith	K. Dalley
1. Does the student approach the work in a positive manner?					
2. Is the student struggling with the reading level?					
3. Does the student make good use of time?					
4. Does the student apply an appropriate study method?					
5. Can the student use references effectively?					

Observation may suggest a need for an individual interview with a student.

Individual Conferences

Individual conferences may be paced (scheduled) by the calendar, designated at certain points in the module, or they may be set up only as needed or requested.

During these conferences, the teacher can determine the student's progress and can assess the student's attitudes towards the subject, program, school, and self, as well as the student's relationship with other students. With guided questions, the teacher can encourage oral self-assessment; the student can discuss personal strengths or weaknesses in regard to the particular section, module, or subject area.

Self-Appraisal

Self-appraisal helps students recognize their own strengths and weaknesses. Through activities that require self-assessment, students also gain immediate feedback and clarification at early stages in the learning process. Teachers need to promote a responsible attitude towards these self-assessment activities. Becoming effective self-assessors is a crucial part of becoming autonomous learners. By instructing, motivating, providing positive reinforcement, and systematically supervising, learning facilitators will help students develop a positive attitude towards their own progress.

For variation, students may be paired and peer-assessing may become part of the system. The teacher may decide to have the student self-assess some of the activities, to have a peer assess other activities, and to become directly involved in assessing the remainder of the activities.

When the modular activities have been assessed, students should be directed to make corrections. This task should be made clear to students right from the beginning. It is important to establish the correct association between the question and the response to clarify understanding, aid retention, and be of use for study purposes.

Many of the activities include choices for students. If students are having difficulty, more practice may be warranted, and students may need to be encouraged to select more of the choices.

Each section within a Student Module Booklet includes additional types of activities called Extra Help and Enrichment. Students are expected to be involved in the decision as to which pathway best suits their needs. They may decide to do both.

Self-appraisal techniques can also be introduced at the individual conferences. Such questions as the following might be included:

- What steps are you taking to improve your understanding of this topic?
- What method of study do you use most?
- How do you organize the material to help you remember it?
- What steps do you follow when you complete an assignment?
- What could you do to become an even better reader?
- Do you have trouble following directions?
- Did you enjoy this module?

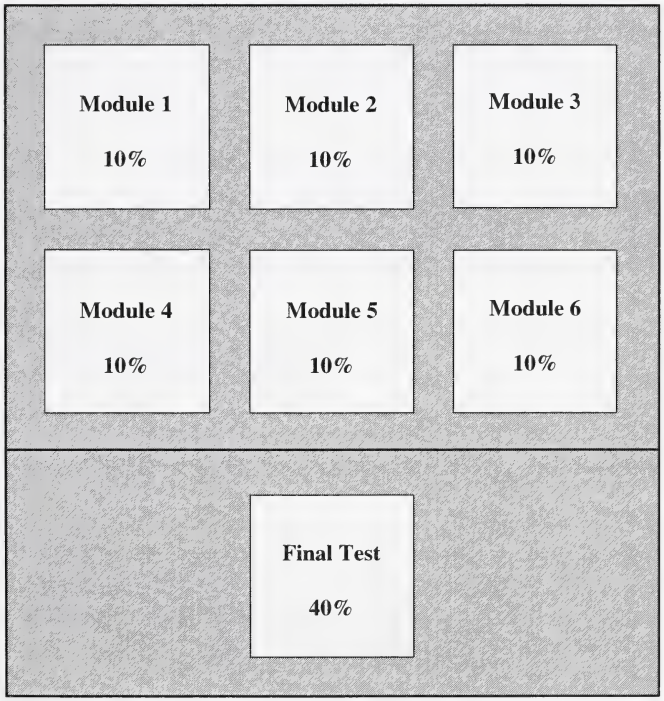
A chart or checklist could be used for recording responses.

Assignments

Each module contains a separate booklet called the Assignment Booklet. This booklet is an informal evaluation tool for assessing the knowledge or skills that the student has gained from the module. **The student's mark for the module may be based solely on the outcome of learning evident in the Assignment Booklet; however, you may decide to establish a value for other variables such as attitude or effort.** It is important that you establish at the beginning of the course and each module those outcomes that will be evaluated, and ensure that all students clearly understand what is expected.

Formal Evaluation

This LFM includes a formal Final Test that can be photocopied for each member of the class. The test, closely linked to the learning outcomes stated in the Student Module Booklets, gives the teacher precise information concerning what each student can or cannot do. Answers, explanations, and marking guides are also included. The value of the Final Test and each module is the decision of the classroom teacher. Following is a suggestion only.



Introducing Students to the System

Your initiation to these learning materials began with a basic survey of what was included and how the components varied. This same process should be repeated with the class. After the materials have been explored, a discussion might include the advantages and the disadvantages of learning independently or in small groups. The roles of the student and teacher should be analysed. The necessary progress checks and rules need to be addressed. Your introduction should motivate students and build a responsible attitude towards learning autonomously.

Skill Level

It is important for students to understand that there are certain skills that they will need in order to deal successfully with the course materials. Those skills are as follows:

- understanding and using instructional materials (table of contents, index, appendices, and glossary)
- interpreting tables, graphs, and diagrams
- using reference materials
- recognizing special symbols
- using a scientific calculator
- understanding and using different forms of media

Other general skills follow: using reliable study methods, outlining, and learning to read at a flexible rate.

To decide the level and amount of instruction needed to accommodate the varied levels among students, you may wish to prepare and administer skill inventories or pretests. If most students need help with a particular skill, you may want to plan a total-class instructional session. If only certain students lack a skill, you may want to set up a temporary skill group to help students who need it, or you may want to develop a skills file for this purpose.

Reading Level

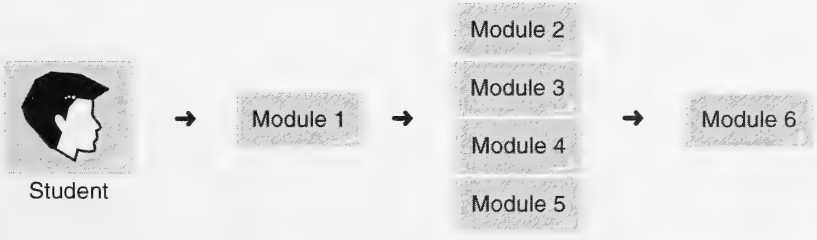
These course materials are largely print based, but poorer readers need not be discouraged. It is important that you assure students that these materials have been designed for easy reading. The authors have employed special strategies to reduce and control the reading level. Some of them are as follows:

- the conscious selection of vocabulary and careful structuring of sentences to keep the materials at an independent reading level
- the integration of activities, examples, and illustrations to break text into appropriate-sized chunks

- the inclusion of many kinds of organizers (advance, graphic, intermediate, concept mapping, post organizers) to help give students a structure for incorporating new concepts
- the recognition that vocabulary and concepts are basic to understanding the content and, thus, must be handled systematically (defined in context, signalled in marginal notes or footnotes, and cited in a glossary)
- the acknowledgement that background knowledge and experience play a vital role in comprehension
- the systematic inclusion of illustrations, videos, audiocassettes, and software to help poorer readers and visual learners
- a use of a variety of formats (paragraphs, lists, charts, etc.) to help struggling readers who do not absorb or retain main ideas easily in paragraph format
- the inclusion of media and activity choices to encourage an active rather than passive approach
- the development of instruction in a meaningful setting rather than in a contrived, workbook style
- the use of purposeful reading, viewing, and doing to produce better interpretation of the course materials
- the recognition that students need structured learning experiences when reading, viewing, or listening to instructional materials; and the acknowledgement that the recognized reading process provides such a structured framework by emphasizing the following phases: developing pupil readiness, determining the purpose, providing guided instruction and feedback, ensuring opportunity to reread or review if necessary, and including enrichment or extensions

To help make the learning package more readable, you can begin your course or module preparation by reading (viewing, listening to) all the related materials that are going to be used. You will need this solid understanding in order to link the content to the students' experiential base. This linking may be done through class brainstorming sessions concerning the topic or by using visuals and guided questions to predict what the course or modules might be about. Such a strategy helps poorer readers strengthen their abilities to be able to predict new vocabulary.

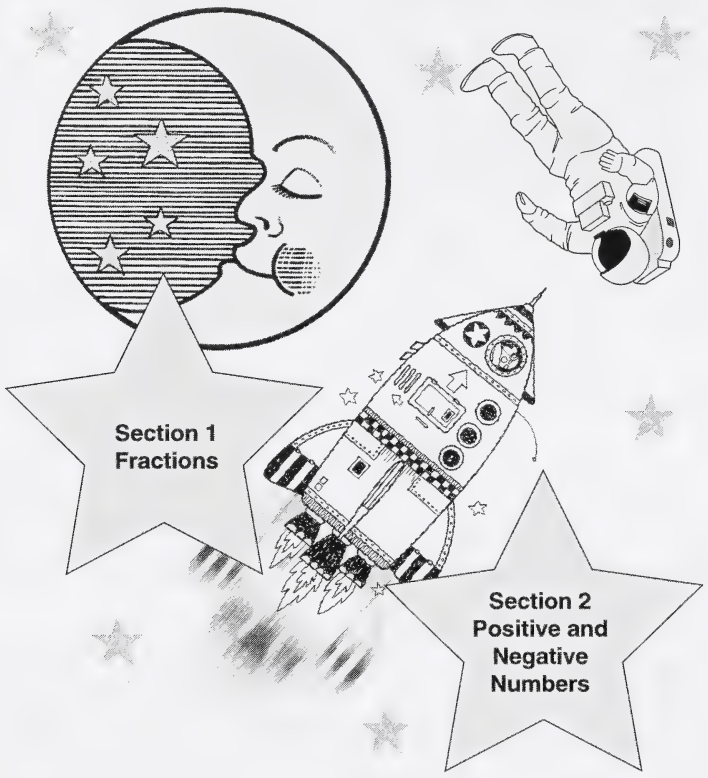
It is recommended that you have students begin with Module 1, because this module includes basic introductory information, and it is also recommended that you end with Module 6, because this module acts as a summary or culmination.



Module 1: Number Connections

Overview

In Module 1 students will increase their number sense by working with fractions, integers, and positive and negative decimal numbers. They will use these numbers in problem-solving settings. They will model operations on fractions with pattern blocks, operations on integers with two-coloured counters, and operations on positive and negative decimal numbers with two-coloured base ten blocks. They will compare and order positive and negative numbers. They will plot positive and negative numbers on graphs.



Evaluation

The evaluation of this module will be based on three assignments:

Section 1 Assignment	**42 marks**
Section 2 Assignment	**26 marks**
Final Module Assignment	**32 marks**
TOTAL	**100 marks**

Section 1: Fractions

Key Concepts

- addition
- subtraction
- multiplication
- division

The goals of this section are to ensure that students can model operations on fractions with pattern blocks, and that they can link the concrete and pictorial representations with paper-and-pencil methods. By the time they finish this module, students will be able to estimate and calculate the sums, differences, products, and quotients of fractions and mixed numbers. They will be able to perform operations using a paper-and-pencil method, mental computation, or a calculator.

Gathering Materials

For this section, students will need a scientific calculator with a fraction key. Students will also require a videocassette player, the video programs *Adding and Subtracting Fractions* and *Multiplying and Dividing Fractions* from the series *Math Moves* (a compilation tape for this course is available from LRDC), and pattern blocks. (You may wish to photocopy the pages of pattern blocks in the Appendix of the Student Module Booklet so that students may cut out these learning aids. The pages can be laminated or glued to heavy paper (card stock) first; this will make the pattern blocks easier to handle. Alternatively, you may provide plastic or wooden pattern blocks. These are available from suppliers of educational materials.)

Students will also require scissors, glue, card stock, and four pennies.

For extra help in adding, subtracting, multiplying, and dividing fractions, students may wish to use the optional software *Understanding Fractions* from the series *Understanding Math* (available from LRDC).

Students who wish to do research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as TELUS.

Section 1: Assignment Answer Key (42 marks)

1. D **(2 marks)**

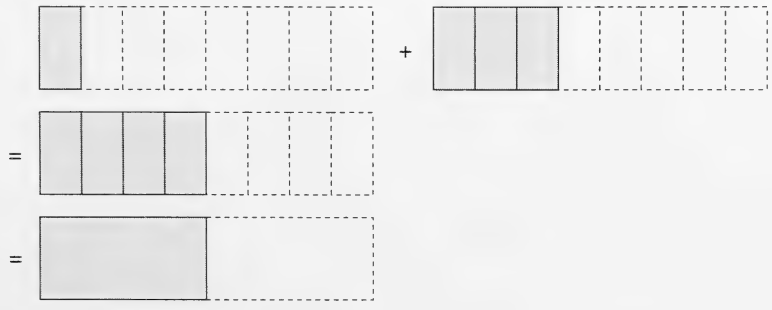
2. **a.** $\frac{1}{8}+\frac{3}{8}=\frac{1+3}{8}$

$=\frac{4}{8}$

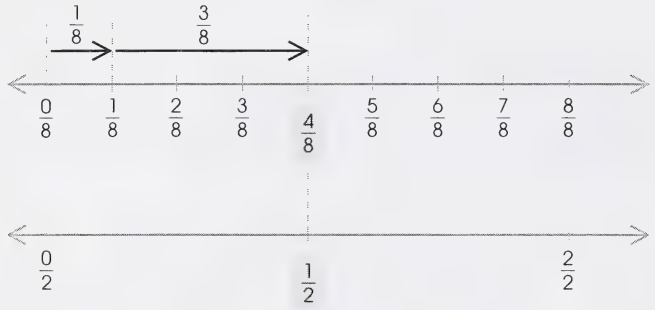
$=\frac{1}{2}$

Andrew read $\frac{1}{2}$ of the book on the two days. **(2 marks)**

b. Diagrams should look similar to this:



Number lines should look like this:



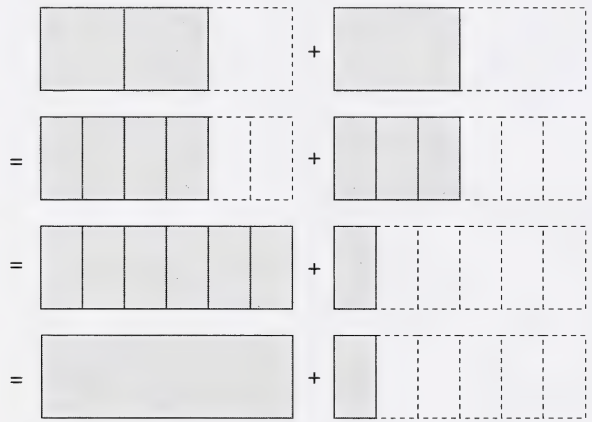
(2 marks)

3. a. $\frac{2}{3}+\frac{1}{2}=\frac{4}{6}+\frac{3}{6}$

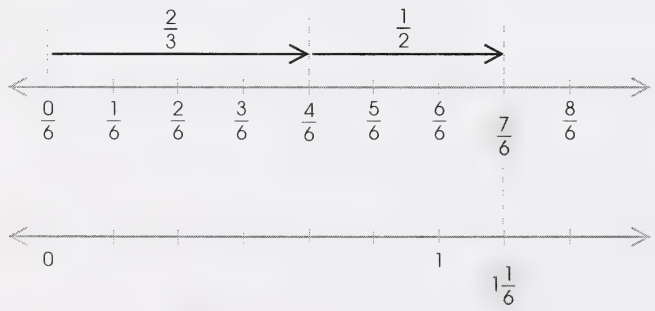
$=\frac{7}{6}$

$=1\frac{1}{6}$ Hussein had $1\frac{1}{6}$ cartons of milk. **(2 marks)**

b. Diagrams should look similar to the following. (Students may choose to use circles or other shapes instead of rectangles.)



Number lines should look like this:



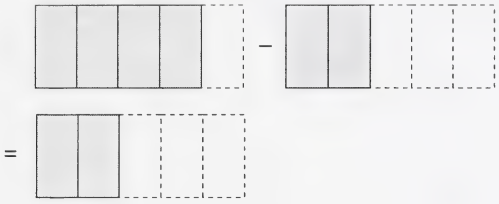
(2 marks)

4. a. $\frac{4}{5} - \frac{2}{5} = \frac{4-2}{5}$

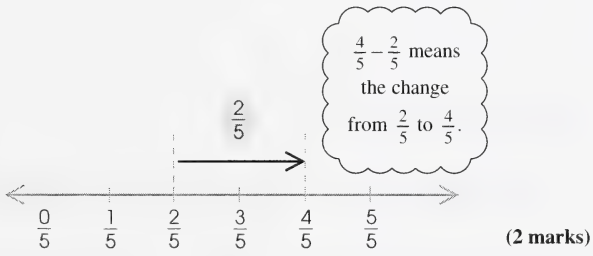
$= \frac{2}{5}$

Robin picked $\frac{2}{5}$ of a basket more than Joan. **(2 marks)**

b. Diagrams should look similar to the following. (Students may choose to use circles or other shapes instead of rectangles.)



Number lines should look like this:



(2 marks)

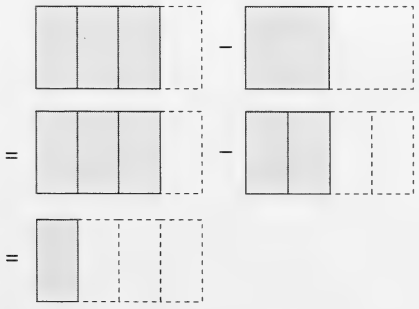
5. a. $\frac{3}{4} - \frac{1}{2} = \frac{3}{4} - \frac{2}{4}$

$= \frac{3-2}{4}$

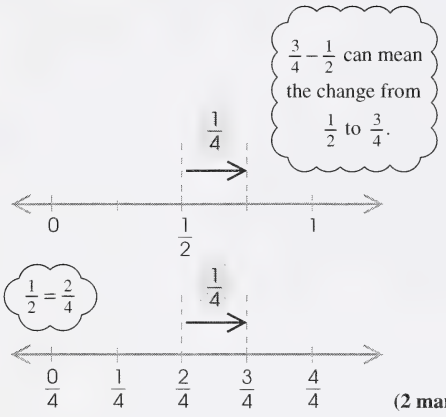
$= \frac{1}{4}$

Mark spent $\frac{1}{4}$ h more than Hans on his chores. **(2 marks)**

b. Diagrams should look similar to the following. (Students may choose to use circles or other shapes instead of rectangles.)



Number lines should look like this:



(2 marks)

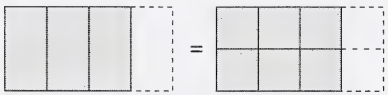
6. a. $\frac{1}{2}\times\frac{3}{4}=\frac{1\times3}{2\times4}$

$=\frac{3}{8}$

One-half of the recipe would need $\frac{3}{8}$ of a banana. **(2 marks)**

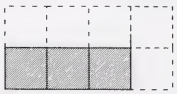
b. The explanation and diagrams should be similar to the following. (Students may choose to use circles or other shapes instead of rectangles.)

The expression $\frac{1}{2}\times\frac{3}{4}$ means "1 of 2 equal parts of $\frac{3}{4}$ is **how much**?" The following diagram shows that 3 fourths is equal to 6 eighths.

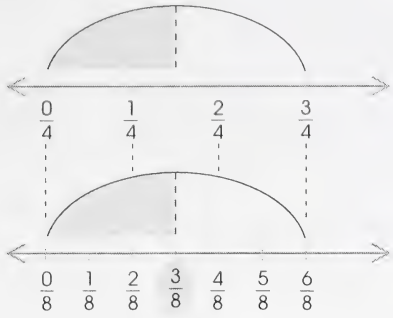


Ask yourself "1 of 2 equal parts of $\frac{6}{8}$ is **how much**?" The dark shading in this diagram shows 1 of 2 equal parts of 6 eighths.

This diagram shows that 1 half of 6 eighths is equal to **3 eighths** of the whole.



Number lines should look like this:



(2 marks)

7. a. $4 \div \frac{1}{3} = \frac{12}{3} \div \frac{1}{3}$ **or** $4 \div \frac{1}{3} = \frac{4}{1} \div \frac{3}{1}$

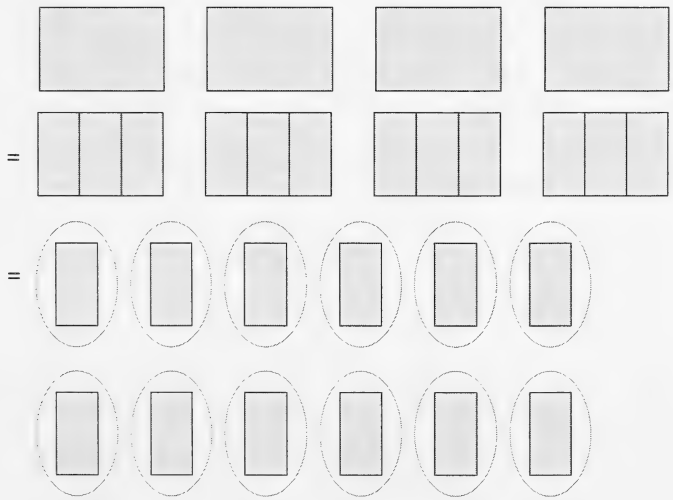
$= 12 \div 1$ $= \frac{4 \times 3}{1 \times 1}$

$= 12$ $= 12$

Leonard will have 12 bags of oranges. **(2 marks)**

b. The explanation and diagrams should be similar to the following. (Students may choose to use circles or other shapes instead of rectangles.)

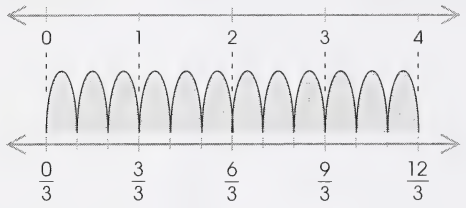
The expression $4 \div \frac{1}{3}$ means, "There are **how many groups** of $\frac{1}{3}$ in 4?"



In 4, there are 12 groups of $\frac{1}{3}$.

Number lines should look like this:

The expression $4 \div \frac{1}{3}$ means, "There are **how many groups** of $\frac{1}{3}$ in 4?"



In 4, there are **12 groups** of $\frac{1}{3}$. **(2 marks)**

8. a. $2\frac{1}{4} - 1\frac{1}{2} = \frac{9}{4} - \frac{3}{2}$

$= \frac{9}{4} - \frac{6}{4}$

$= \frac{9-6}{4}$

$= \frac{3}{4}$

or

$$\begin{array}{r} 2\frac{1}{4} \\ -\ 1\frac{1}{2} \\ \hline \end{array} \quad = \quad \begin{array}{r} 2\frac{1}{4} \\ -\ 1\frac{2}{4} \\ \hline \end{array} \quad = \quad \begin{array}{r} 1\frac{5}{4} \\ -\ 1\frac{2}{4} \\ \hline \frac{3}{4} \end{array}$$

Reggie ate $\frac{3}{4}$ of a chocolate bar more than Hank. **(2 marks)**

b.

Rounding

$2\frac{1}{4} - 1\frac{1}{2} \doteq 2 - 2$

$\doteq 0$

Because $\frac{3}{4}$ is close to 0, the answer is reasonable.

or

Front-end Digits

$2\frac{1}{4} - 1\frac{1}{2} \doteq 2 - 1$

$\doteq 1$

Because $\frac{3}{4}$ is close to 1, the answer is reasonable. **(2 marks)**

9. a. $2\frac{3}{4} + 1\frac{1}{2} = \frac{11}{4} + \frac{3}{2}$

$= \frac{11}{4} + \frac{6}{4}$

$= \frac{17}{4}$

$= 4\frac{1}{4}$

or

$$\begin{array}{r} 2\frac{3}{4} \\ +\ 1\frac{1}{2} \\ \hline \end{array} \quad = \quad \begin{array}{r} 2\ \frac{3}{4} \\ +\ 1\ \frac{2}{4} \\ \hline \frac{5}{4} \end{array} \quad = \quad \begin{array}{r} {}^{1}2\frac{3}{4} \\ +\ 1\frac{2}{4} \\ \hline 4\frac{1}{4} \end{array}$$

This step can be done mentally.

Altogether, Kerstin spent $4\frac{1}{4}$ h on these two activities. **(2 marks)**

b. **Rounding** **or** **Front-end Digits**

$2\frac{3}{4}+1\frac{1}{2}\doteq 3+2$ $\quad$ or $\quad$ $2\frac{3}{4}+1\frac{1}{2}\doteq 2+1$

$\doteq 5$ $\qquad\qquad$ $\doteq 3$

Because $4\frac{1}{4}$ is close to 5, the answer is reasonable. $\qquad$ Because $4\frac{1}{4}$ is close to 3, the answer is reasonable. **(2 marks)**

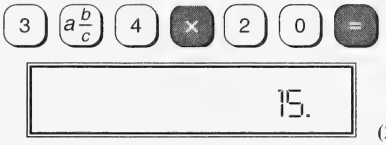
10. **a.** $\frac{3}{4}\times 20=\frac{3}{4}\times\frac{20}{1}$ $\quad$ **or** $\quad$ $\frac{3}{4}\times 20=\frac{3}{4}\times\frac{20}{1}$

$=\frac{60}{4}$ $\qquad\qquad$ $=\frac{3\times\overset{5}{\cancel{20}}}{\underset{1}{\cancel{4}}\times 1}$

$=15$ $\qquad\qquad$ $=15$

Carson spends 15 h reading the newspaper. **(2 marks)**

b. Press these keys:



(2 marks)

11. **a.** $1\frac{1}{4}\div 5=\frac{5}{4}\div 5$ $\quad$ **or** $\quad$ $1\frac{1}{4}\div 5=\frac{5}{4}\div 5$

$=\frac{5}{4}\div\frac{20}{4}$ $\qquad\qquad$ $=\frac{5}{4}\times\frac{1}{5}$

$=\frac{5\div 20}{4\div 4}$ $\qquad\qquad$ $=\frac{\overset{1}{\cancel{5}}\times 1}{4\times\underset{1}{\cancel{5}}}$

$=\frac{5}{20}$ $\qquad\qquad$ $=\frac{1}{4}$

$=\frac{1}{4}$

On average, it took $\frac{1}{4}$ h to wash one car. **(2 marks)**

b. **Rounding** **or** **Front-end Digits**

$1\frac{1}{4}\div 5\doteq 1\div 5$ $\qquad\qquad$ $1\frac{1}{4}\div 5\doteq 1\div 5$

$=\frac{1}{5}$ $\qquad\qquad$ $=\frac{1}{5}$

Because $\frac{1}{4}\doteq\frac{1}{5}$, the answer is reasonable. **(2 marks)**

Section 2: Positive and Negative Numbers

Key Concepts

- comparing and ordering
- multiplying
- subtracting
- adding
- dividing
- plotting points on a graph

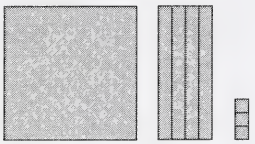
Gathering Materials

For this section students will need two-coloured counters and two-coloured base ten blocks. (You may wish to photocopy the pages of counters and base ten blocks in the Appendix of the Student Module Booklet so that students may cut out these learning aids. The pages can be laminated or glued to heavy paper first; this will make the learning aids easier to handle. Alternatively, you may provide two-coloured counters or two-coloured wooden or plastic base ten blocks. These are available from suppliers of educational materials.)

Students who wish to do research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as TELUS.

Section 2: Assignment Answer Key (26 marks)

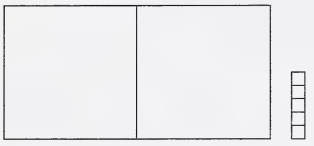
1. a.



(1 mark)

Students must differentiate between blocks representing positive numbers and those representing negative numbers. They might do this using shading, colour, or texture.

b.



(1 mark)

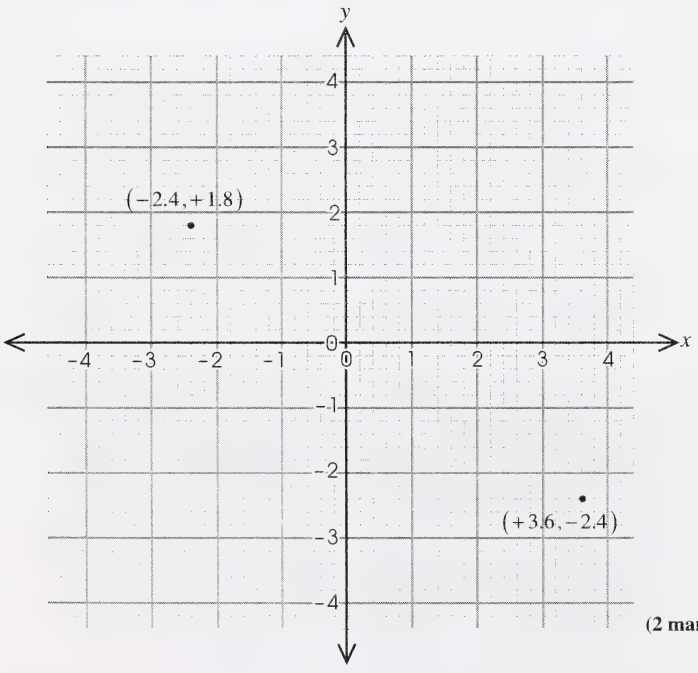
2.

(2 marks)

3. Answers will vary. Accept arguments such as the following:

- The number -0.43 is farther to the left on the number line than -0.34, so -0.43 is smaller.
- The number -0.43 has a greater absolute value than -0.34, so -0.43 is farther in a negative direction from the starting point of zero. **(2 marks)**

4.



(2 marks)

5. Answers will vary. Give credit for reasons to back up opinions. Following is one possible answer.

I found that actually modelling the numbers with counters or base ten blocks and exchanging counters for their opposites helped me to understand that the product of two negative numbers is a positive number. **(2 marks)**

6. **a.** $(-0.25)+(+0.13)=-(0.25-0.13)$

$=-0.12$

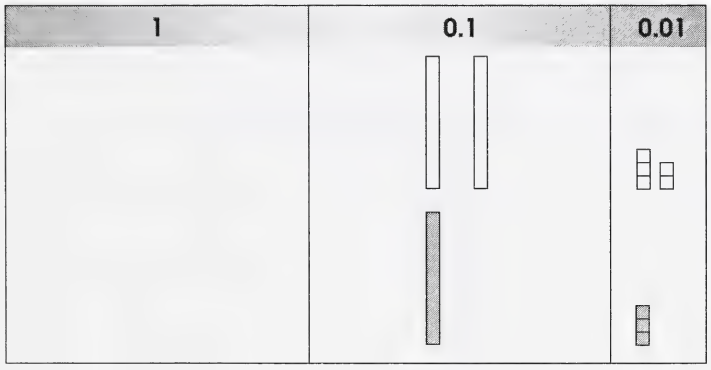
$$\begin{array}{r} 0.25 \\ -\ 0.13 \\ \hline .12 \end{array}$$

The result is a drop of \$0.12 over the two days. **(2 marks)**

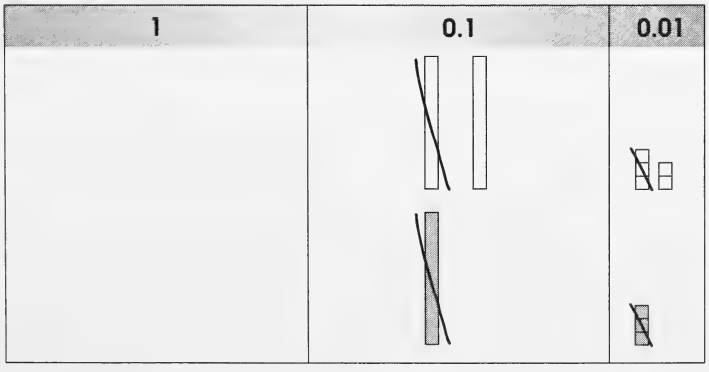
b. represents -0.25. represents $+0.13$.

Students must differentiate between blocks representing positive numbers and those representing negative numbers.

To illustrate the addition, model -0.25 and $+0.13$. Then combine them.



Identify and remove any zero pairs.



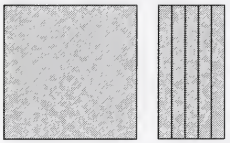
The result is 1 long and 2 small cubes. All the blocks are negative. This represents -0.12. **(2 marks)**

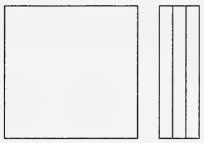
7. a. $(+1.5)-(-1.3)=(+1.5)+(+1.3)$

$=+2.8$

$$\begin{array}{r} 1.5 \\ +\ 1.3 \\ \hline 2.8 \end{array}$$

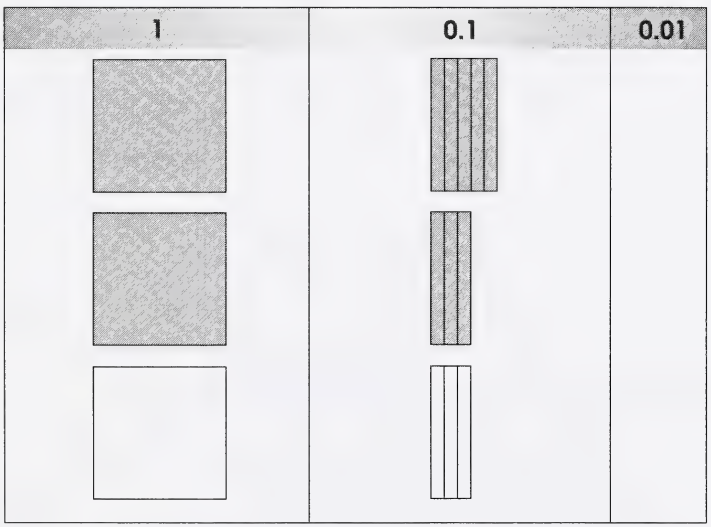
Freddie experienced a rise in temperature of $2.8°C$. **(2 marks)**

b.  represents $+1.5$.

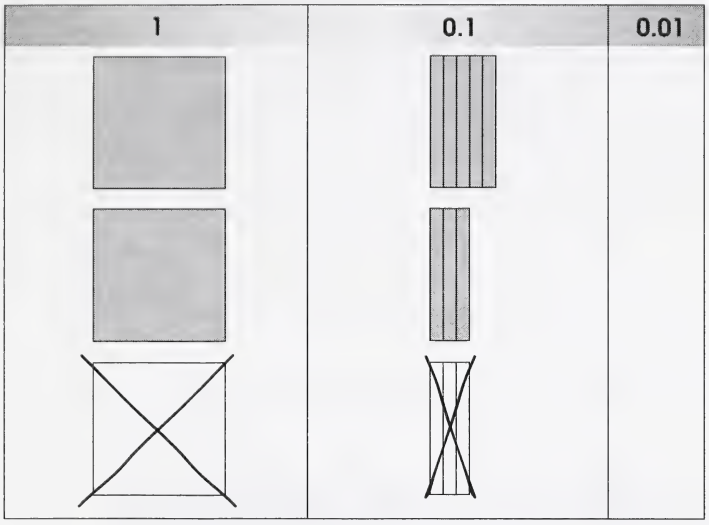
 represents -1.3.

Students must differentiate between blocks representing positive numbers and those representing negative numbers.

To illustrate the subtraction, you must remove -1.3 from $+1.5$. Before you can do this you must add zero pairs. Model $+1.5$ and add zero pairs. This will not change the value of $+1.5$.



Now remove -1.3.



The result is 2 flats and 8 longs. All the blocks are positive. This represents $+2.8$. **(2 marks)**

8. a. $(+2.5)\times(-13.5)=-(2.5\times13.5)$

$=-33.75$

The windchill equivalent temperature was $-33.75°\text{C}$. **(2 marks)**

$$\begin{array}{r} 13.5 \\ \times\ \ 2.5 \\ \hline 675 \\ 270 \\ \hline 33.75 \end{array}$$

b.

Rounding

$(+2.5)\times(-13.5)\doteq(+3)\times(-14)$

$\doteq-42$

Since -33.75 is close to -42, the answer is reasonable.
(2 marks)

Front-end Digits

$(+2.5)\times(-13.5)\doteq(+2)\times(-13)$

$\doteq-26$

Since -33.75 is close to -26, the answer is reasonable.

9. a. $(-4.9)\div(+3.5)=-(4.9\div3.5)$

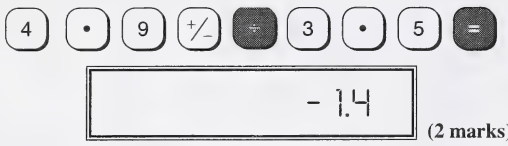
$=-1.4$

The average change in temperature was a drop of $1.4°\text{C}$. **(2 marks)**

$3.5\overline{)4.9} \longrightarrow 35\overline{)49}$

$$\begin{array}{r} 1.4 \\ 35\overline{)49.0} \\ 35 \\ \hline 14\,0 \\ 14\,0 \\ \hline 0 \end{array}$$

b. Press the following key sequence.



(2 marks)

Final Module Assignment Answer Key (32 marks)

1. a.
$$\frac{1}{4}\times\frac{5}{6}=\frac{1\times5}{4\times6}$$
$$=\frac{5}{24}$$

Dale gave his horse $\frac{5}{24}$ of a bale. **(4 marks)**

b.
$$\frac{5}{6}\div\frac{1}{4}=\frac{10}{12}\div\frac{3}{12}$$
$$=10\div3$$
$$=\frac{10}{3}$$
$$=3\frac{1}{3}$$

or
$$\frac{5}{6}\div\frac{1}{4}=\frac{5}{6}\times\frac{4}{1}$$
$$=\frac{5\times4}{6\times1}$$
$$=\frac{5\times\overset{2}{\cancel{4}}}{\underset{3}{\cancel{6}}\times1}$$
$$=\frac{10}{3}$$
$$=3\frac{1}{3}$$

The hay will last $3\frac{1}{3}$ days. **(4 marks)**

c.
$$\frac{5}{6}-\frac{1}{4}=\frac{10}{12}-\frac{3}{12}$$
$$=\frac{7}{12}$$

Dale has $\frac{7}{12}$ of a bale left. **(4 marks)**

2.
$$\frac{5}{6}+\frac{1}{4}=\frac{10}{12}+\frac{3}{12}$$
$$=\frac{13}{12}$$
$$=1\frac{1}{12}$$

Thierry picked $1\frac{1}{12}$ baskets altogether. **(4 marks)**

3.
$$(-2.8)\times(-4)=+(2.8\times4)$$
$$=+11.2$$

$$\begin{array}{r}2.8\\ \times\quad 4\\ \hline 11.2\end{array}$$

Think of east as positive and west as negative.

Amanda was 11.2 m east of her present position. **(4 marks)**

4.
$$(+2.8)+(-4.0)=-(4.0-2.8)$$
$$=-1.2$$

$$\begin{array}{r}4.0\\ -\ 2.8\\ \hline 1.2\end{array}$$

It is $-1.2°C$ in Red Deer. **(4 marks)**

5. $(-2.80) \div (+4) = -(2.80 \div 4)$
$= -0.70$

On average, there was a drop of \$0.70 per day. **(4 marks)**

6. $(+2.80) - (-4.00) = (+2.80) + (+4.00)$
$= +6.80$

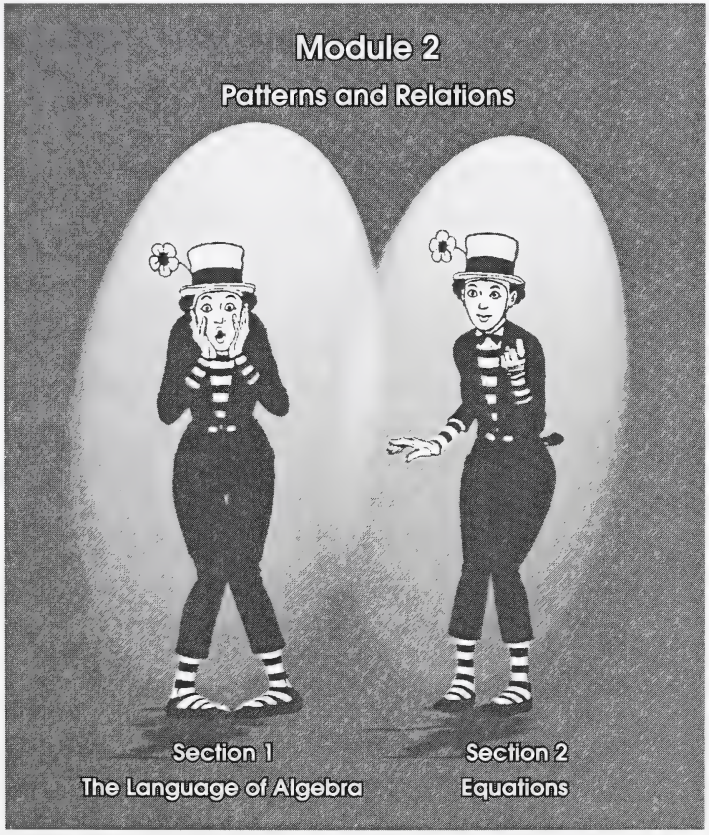
$$\begin{array}{r} 2.80 \\ +\ 4.00 \\ \hline 6.80 \end{array}$$

Amanda had \$6.80 in her piggy bank before the withdrawal. **(4 marks)**

Module 2: Patterns and Relations

Overview

In Module 2 students will use the language of algebra to generalize patterns, write formulas, and graph mathematical relations. Students will continue to use their problem-solving skills.



Evaluation

The evaluation of this module will be based on three assignments:

Section 1 Assignment	**40 marks**
Section 2 Assignment	**50 marks**
Final Module Assignment	**10 marks**
TOTAL	**100 marks**

Section 1: The Language of Algebra

Key Concepts

- variables
- formulas
- generalizing patterns
- algebraic expressions
- graphs

The basic goals of this section are to ensure that students can take an idea expressed in words and change it into mathematical symbols and vice versa. Students should be able to graph mathematical relations and use algebra to generalize a pattern.

Gathering Materials

For this section, students will need a scientific calculator and graph paper. Students will also require the counters and the cylinders. (You may wish to photocopy the pages of cylinders and counters in the Appendix of the Student Module Booklet so that students may cut out these learning aids. The pages can be laminated or glued to heavy paper (card stock) first; this will make the learning aids easier to handle.)

Students require a computer and a spreadsheet program such as *ClarisWorks*™, *Microsoft® Works*, or *Microsoft® Excel.*

Students may use play money and toothpicks as learning aids.

Students who wish to do research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as TELUS.

Section 1: Assignment Answer Key (40 marks)

1. Students may use any variable to represent the number of jellybeans in each jar.

a. $n+2$ **(2 marks)** **b.** $3n+3$ **(2 marks)**

2. Students may use any variable to represent the unspecified number.

$\frac{n}{2}-3$ **(2 marks)**

3. Answers will vary. Acceptable answers include the following.

a. three times n, plus one
three times n, increased by one
three times n, add one
one more than, three times n **(2 marks)**

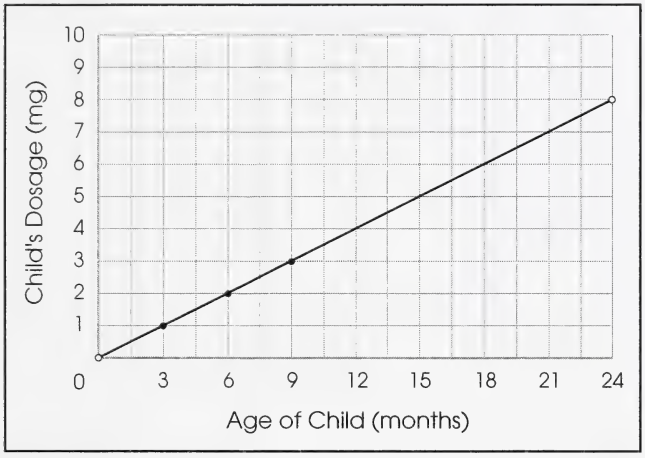
b. five minus, nine times n
five minus the product of nine and n
five decreased by, nine times n
nine times n, subtracted from five **(2 marks)**

4. a.

Age of Child (in months)	Recommended Child's Dosage (in mg)
3	1
6	2
9	3
12	4
15	5
18	6

(4 marks)

b.

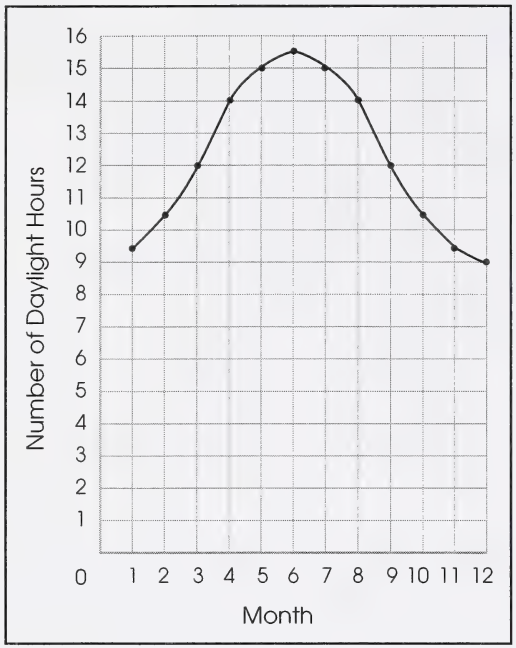


(4 marks)

Note: Because Friend's rule is for children under 2 years of age, the graph does not have arrowheads. Students may choose to put open dots to indicate a minimum and a maximum.

c. The older the child is, the greater the dosage will be. **(2 marks)**

5. a.



Note: Because this graph is for the time period of January to December, the graph does not have arrowheads. Students who view this data as a pattern that continues from year to year may choose to put arrowheads on the ends of the curve.

(4 marks)

b. The 6th month (June) had the most daylight hours. **(1 mark)**

c. The 12th month (December) had the least daylight hours. **(1 mark)**

d. The number of hours of daylight increases from January to June and then decreases from June to December. **(2 marks)**

6. a. The next two terms in the sequence will be 15 and 17. **(2 marks)**

b.

Position of Term (n)	Term (t)	
1	7	← $t=2\times1+5$
2	9	← $t=2\times2+5$
3	11	← $t=2\times3+5$
4	13	← $t=2\times4+5$
...	...	
n	$2n+5$	← $t=2n+5$

The formula is $t=2n+5$. **(2 marks)**

c. $t=2n+5$

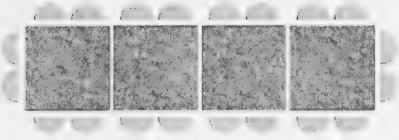
$=2(20)+5$

$=40+5$

$=45$

The 20th term will be 45. **(2 marks)**

7. a.



(2 marks)

b.

Number of Tables (t)	Number of Chairs (c)	
1	8	$\leftarrow c = 4 \times 1 + 4$
2	12	$\leftarrow c = 4 \times 2 + 4$
3	16	$\leftarrow c = 4 \times 3 + 4$
4	20	$\leftarrow c = 4 \times 4 + 4$
...	...	
t	$4t + 4$	$\leftarrow c = 4t + 4$

The formula is $c = 4t + 4$. **(2 marks)**

c. $c = 4t + 4$

$= 4(10) + 4$

$= 40 + 4$

$= 44$

A total of 44 people can be seated. **(2 marks)**

Section 2: Equations

Key Concepts

- balancing equations
- solving equations
- modelling equations
- verifying equations

The basic goals of this section are that students understand that equations must be balanced. They will model, solve, and verify equations. They will use equations to solve problems and evaluate formulas using equation-solving skills.

Gathering Materials

For this section, students will need a scientific calculator and graph paper. Students will also require a videocassette player, the video program *Equations: Solving with More than One Step* from the series *Math Moves* (a compilation tape for this course is available from LRDC), the counters and the cylinders from Section 1, and the scale from the Appendix in this module. (You may wish to photocopy the page of the scale in the Appendix of the Student Module Booklet so that students may cut out this learning aid. The page can be laminated or glued to heavy paper (card stock) first; this will make the scale easier to handle.)

Students require a computer and a spreadsheet program such as *ClarisWorks*™, *Microsoft® Works*, or *Microsoft® Excel*.

Students who wish to do research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as TELUS.

Section 2: Assignment Answer Key (50 marks)

1. a. $x+2=5$

$-2 \quad -2$

$x = 3$

LS	RS
$x+2$	5
$=3+2$	
$=5$	

LS = RS **(3 marks)**

b. $\frac{3x}{3}=\frac{18}{3}$

$x=6$

LS	RS
$3x$	18
$=3(6)$	
$=18$	

LS = RS **(3 marks)**

c. $\frac{m}{4}=2$

$4\left(\frac{m}{4}\right)=4(2)$

$m=8$

LS	RS
$\frac{m}{4}$	2
$=\frac{8}{4}$	
$=2$	

LS = RS **(3 marks)**

d. $3n-1=8$

$+1 \quad +1$

$\frac{3n}{3} = \frac{9}{3}$

$n=3$

LS	RS
$3n-1$	8
$=3(3)-1$	
$=9-1$	
$=8$	

LS = RS **(5 marks)**

e. $\frac{r}{2}+3=7$

$-3 \quad -3$

$\frac{r}{2} = 4$

$2\left(\frac{r}{2}\right) = 2(4)$

$r=8$

LS	RS
$\frac{r}{2}+3$	7
$=\frac{8}{2}+3$	
$=4+3$	
$=7$	

LS = RS **(5 marks)**

f. $\frac{3t}{4} = -6$

$4\left(\frac{3t}{4}\right) = 4(-6)$

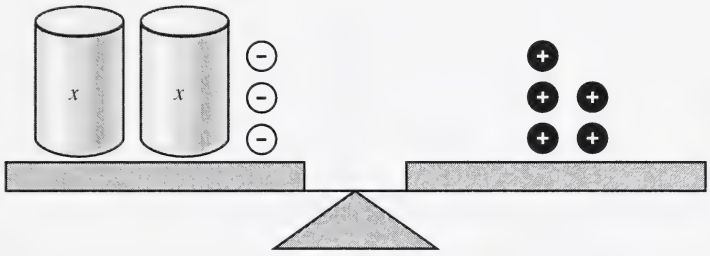
$\frac{3t}{3} = \frac{-24}{3}$

$t = -8$

LS	RS
$\frac{3t}{4}$	-6
$= \frac{3(-8)}{4}$	
$= \frac{-24}{4}$	
$= -6$	

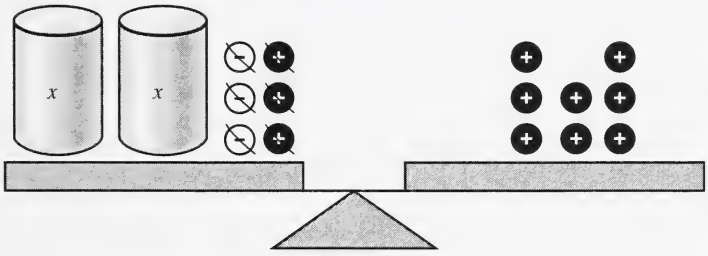
LS = RS **(5 marks)**

2. a. The explanation and diagrams should be like the following.

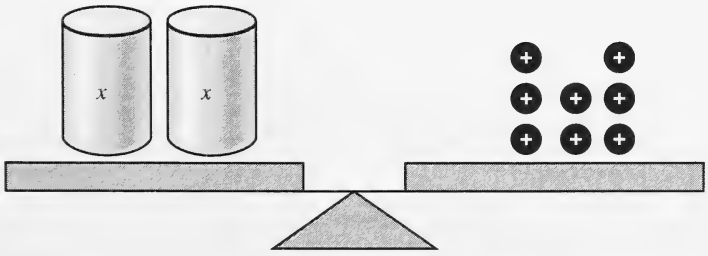


represents $2x - 3 = 5$.

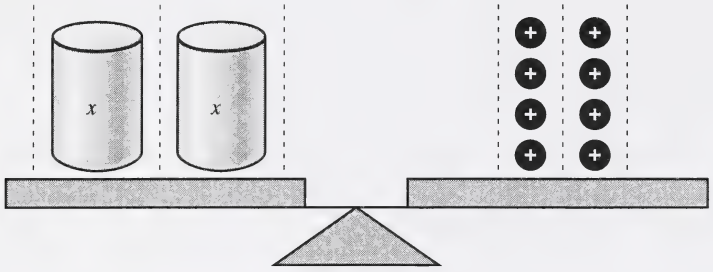
Add $+3$ or three positive counters to **each** side. Remove any zero pairs.



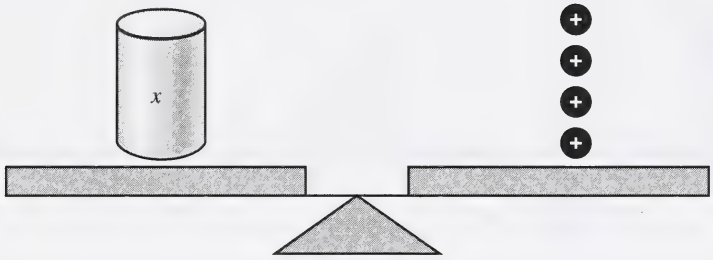
This is the result.



Divide each side into two equal groups.



Examine **one** of each group.



$\therefore\ x = 4$ **(7 marks)**

b. **Step 1:** Isolate the variable by adding 3 to each side of the equation.

$$\begin{array}{rl} 2x - 3 = & 5 \\ +3 & +3 \\ \hline 2x = & 8 \end{array}$$

Step 2: Solve for x by dividing each side by 2.

$$\frac{2x}{2} = \frac{8}{2}$$

$x = 4$ **(3 marks)**

3. **a.** Let n be the number of enlargements.

$$\begin{array}{rl} 12 + 2n = & 20 \\ -12 & -12 \\ \hline \frac{2n}{2} = & \frac{8}{2} \end{array}$$

$n = 4$

Sergei had 4 enlargements made. **(5 marks)**

b. Let c be the regular cost (in \$).

$$\begin{array}{rl} \frac{c}{3} - 5 = & 50 \\ +5 & +5 \\ \hline \frac{c}{3} = & 55 \end{array}$$

$$3\left(\frac{c}{3}\right) = 3(55)$$

$c = 165$

The regular cost was \$165. **(5 marks)**

4. Answers will vary. Here is an example.

a. Michael is twice Peter's age. Michael is 14. How old is Peter? **(3 marks)**

b. Let p be Peter's age.

$$\frac{2p}{2} = \frac{14}{2}$$
$$p = 7$$

Peter is 7. **(3 marks)**

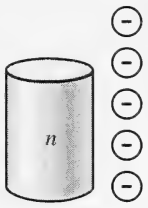
Final Module Assignment Answer Key (10 marks)

1. **a.** The letter "x" may represent an unknown value. **(2 marks)**

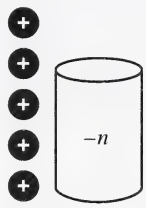
b.
$$3x = 8$$
$$\frac{3x}{3} = \frac{8}{3}$$
$$x = \frac{8}{3}$$
$$= 2\frac{2}{3}$$

The answer is $2\frac{2}{3}$. No, Hobbes didn't answer his question correctly. **(2 marks)**

2. **a.** "Five less than a number" can be written as $n-5$, but it cannot be written as $5-n$. These expressions represent two different expressions because order matters in subtraction.



represents $n-5$.



represents $5-n$. **(2 marks)**

b. If $n=1$, then

$$n-5$$
$$=1-5$$
$$=-4$$

If $n=1$, then

$$5-n$$
$$=5-1$$
$$=4$$

This confirms that $n-5$ and $5-n$ are not equivalent. **(2 marks)**

3. Tina's translation could be interpreted as $3(x-2)$.

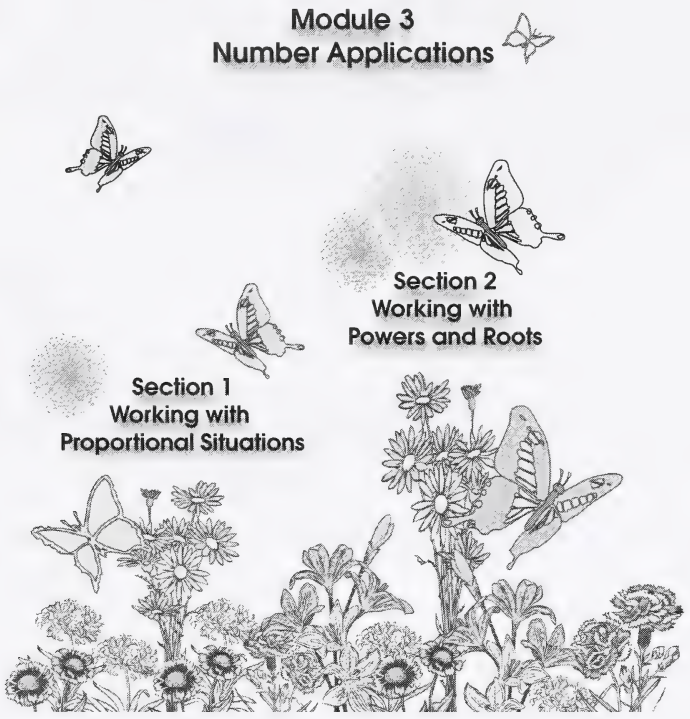
Tina should have translated the expression as, "three times a number, minus two." (A comma is needed to be sure that the order of operations is clear.)

Alternatively, Tina should have translated the expression as, "two less than the product of three and a number." **(2 marks)**

Module 3: Number Applications

Overview

In Module 3 students will increase their number sense by working with proportional situations, powers, and roots.



Evaluation

The evaluation of this module will be based on three assignments:

Section 1 Assignment	**65 marks**
Section 2 Assignment	**25 marks**
Final Module Assignment	**10 marks**
TOTAL	**100 marks**

Section 1: Working with Proportional Situations

Key Concepts

- ratios
- rates
- percents
- proportion
- scale

The basic goals of this section are to ensure that students apply the concepts of ratio, rate, percent, proportion, and scale to solve problems in meaningful contexts.

Gathering Materials

Students will need a scientific calculator. It is desirable that students have a computer and a spreadsheet program such as *ClarisWorks*™. Students who wish to do the research on the Internet will need a browser such as *Netscape*™ and an account with an Internet provider such as TELUS.

Students will need graph paper, scissors, three elastics (rubber bands of the same length and thickness), a paper fastener (a duotang may be substituted), cardboard, tracing paper, a metric ruler, a carpenter's measuring tape, and a calendar.

Students need the video program *The Percent* from the series *Mathways*.

Section 1: Assignment Answer Key (65 marks)

1. **Step 1:** Write a proportion.

pancake mix:water

$$25 : 16$$
$$= \quad :320$$

Step 2: Find the missing term.

pancake mix:water

$$\begin{array}{ccc} 25 & : & 16 \\ \downarrow & & \downarrow \\ \times 20 & & \times 20 \\ \downarrow & & \downarrow \\ = 500 & : & 320 \end{array}$$

The amount of pancake mix required is 500 mL. **(3 marks)**

2. Write the ratio in simplest form.

sugar:oatmeal:flour

$$\begin{array}{ccccc} 250 & : & 500 & : & 750 \\ \downarrow & & \downarrow & & \downarrow \\ \div 250 & & \div 250 & & \div 250 \\ \downarrow & & \downarrow & & \downarrow \\ = 1 & : & 2 & : & 3 \end{array}$$

The ratio of sugar to oatmeal to flour is 1:2:3. **(2 marks)**

3. **a.** All-purpose fertilizer contains the same amount of nitrogen, phosphorus, and potassium. **(1 mark)**
b. Evergreen tree fertilizer has the greatest percent of nitrogen. **(1 mark)**
c. Garden food fertilizer has half as much nitrogen as potassium. **(1 mark)**
d. Evergreen tree fertilizer has the greatest ratio of nitrogen to potassium. **(1 mark)**
e. Lawn fertilizer has the greatest ratio of phosphorus to potassium. **(1 mark)**

4. $\frac{\text{cost}}{\text{dozen}}$

$$\frac{3.6}{1.5} = \frac{2.40}{1}$$

The cost of the apples was $2.40 per dozen. **(2 marks)**

5.

	Soap 1	Soap 2	Soap 3
$\frac{\text{cost}}{\text{mass}}$	$\frac{2.99}{400} \div \frac{0.75}{100}$	$\frac{2.39}{300} \div \frac{0.80}{100}$	$\frac{1.56}{200} = \frac{0.78}{100}$

The soap costing $2.99 for 400 g is the best buy. **(3 marks)**

6.

$\frac{\text{blocks}}{\text{time}}$ $\quad \frac{2}{5} = \frac{24}{60}$ $\quad$ (×12 above, ×12 below) $\quad$ 1 h = 60 min

June can walk 24 blocks in 1 h. **(3 marks)**

7. **Method 1: Doubling the GST**

$2 \times 0.70 \doteq 1.50$

Adelle should leave about $1.50.

Method 2: Rounding

$$\begin{aligned} 15\% \text{ of } 9.98 &\doteq 15\% \text{ of } 10 \\ &\doteq 0.15 \times 10 \\ &\doteq 1.50 \end{aligned}$$

Adelle should leave about $1.50. **(3 marks)**

Note: Students could also use methods like rounding up and down or front-end digits.

8. **Method 1: Using Two Steps**

$$\begin{aligned} &7\% \text{ of } 320 \\ &= 0.07 \times 320 \\ &= 22.4 \end{aligned}$$

$$\begin{array}{r} 320.00 \\ +\ 22.40 \\ \hline 342.40 \end{array}$$

The total cost is $342.40.

Method 2: Using One Step

$$\begin{aligned} &107\% \text{ of } 320 \\ &= 1.07 \times 320 \\ &= 342.4 \end{aligned}$$

100% + 7% = 107%

The total cost is $342.40. **(2 marks)**

9. **a.** **Step 1:** Change the percent to a decimal number.

$$\begin{aligned} 8.5\% &= 8.5 \div 100 \\ &= 0.085 \end{aligned}$$

Step 2: Use the formula to calculate the simple interest.

$$\begin{aligned} I &= Prt \\ &= 3500(0.085)(0.5) \\ &= 148.75 \end{aligned}$$

6 mo = 0.5 a

The simple interest is $148.75. **(3 marks)**

b. **Step 1:** Change the percent to a decimal number.

$27\% = 0.27$ (2.25%/mo = 27%/a)

Step 2: Use the formula to calculate the simple interest.

$$I = Prt$$
$$= 4000(0.27)(1)$$
$$= 1080$$

The interest is \$1080. **(3 marks)**

10. **a.** **Step 1:** Find the first discount.

$$20\% \text{ of } 375$$
$$= 0.2 \times 375$$
$$= 75$$

The first discount was \$75.

Step 2: Find the first sale price.

$$375 - 75 = 300$$

The first sale price was \$300. **(2 marks)**

b. **Step 1:** Find the second discount.

$$25\% \text{ of } 300$$
$$= 0.25 \times 300$$
$$= 75$$

The second discount was \$75.

Step 2: Find the second sale price.

$$300 - 75 = 225$$

The second sale price was \$225. **(2 marks)**

11. **Step 1:** Find the length of the model in centimetres.

model:actual

$$\begin{array}{rcl} 60 & : & 1 \\ \downarrow & & \downarrow \\ \times 33 & & \times 33 \\ \downarrow & & \downarrow \\ = \ 1980 & : & 33 \end{array}$$

The scale model was 1980 cm long.

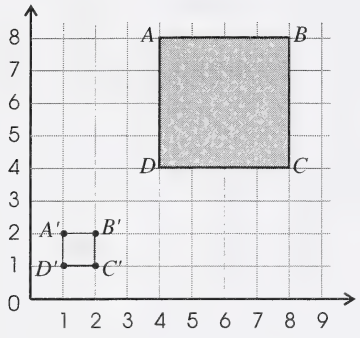
Step 2: Find the length of the model in metres.

$$100 \text{ cm} = 1 \text{ m}$$
$$\therefore 1980 \text{ cm} = 19.8 \text{ m}$$

The scale model was 19.8 m long. **(3 marks)**

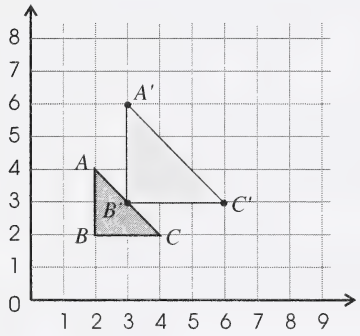
12. Answers will vary. Students should include both the original cartoon strip and the enlargement. **(5 marks)**

13. a.



Square $A'B'C'D'$ is the image. **(2 marks)**

b.



Triangle $A'B'C'$ is the image. **(2 marks)**

c. If you connected the dilatation centre and a pair of corresponding vertices, a straight line would be produced. **(1 mark)**

14. a. On this map 1 cm represents 1200 km. **(1 mark)**

b. **Step 1:** Measure the straight-line distance (in centimetres) on the map.

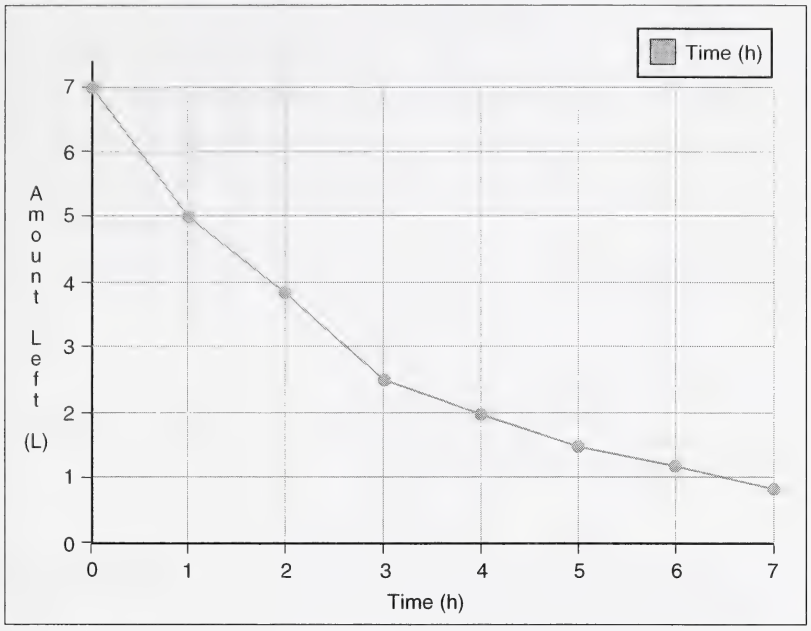
On the map the straight-line distance is 4 cm.

Step 2: Calculate the actual distance in centimetres.

$$\frac{\text{drawn (cm)}}{\text{actual (km)}} \qquad \frac{1}{1200} \overset{\times 4}{=} \frac{4}{4800}$$

The actual straight-line distance is 4800 km. **(3 marks)**

15. a. This is one example of the spreadsheet graph. Hand-drawn graphs will look similar.



(4 marks)

b. No, the situation is not proportional. If the situation was proportional, the graph would be a straight line, passing through the origin and leaning upward to the right. **(2 marks)**

16. a. $d = st$

$\frac{5}{50} = \frac{50t}{50}$

$\frac{1}{10} = t$ **or** $t = 0.1$

Marika took $\frac{1}{10}$ h or 0.1 h to travel 5 km.

1 h = 60 min
0.1 h = 6 min

Marika took 6 min to travel 5 km. **(3 marks)**

b. $10 - 5$

Marika must travel 5 km more.

$9 - 6 = 3$

Marika has 3 min left.

60 min = 1 h
3 min = 0.05 h

Marika has 0.05 h left.

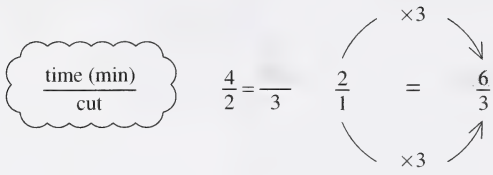
$d = st$

$\frac{5}{0.05} = \frac{s(0.05)}{0.05}$

$100 = s$

Marika must travel at least 100 km/h to get to the airport on time. **(3 marks)**

17. Frank saws 2 cuts in order to make three pieces.



It will take Frank 6 min to make three cuts and produce four pieces. **(3 marks)**

Section 2: Working with Powers and Roots

Key Concepts

- powers
- square root
- Pythagorean relation

The basic goals of this section are to demonstrate a number sense about squares and square roots and to apply the operations of raising a number to a power and to extract the square root in order to solve problems.

Gathering Materials

For this section, students will need a scientific calculator, graph paper, and two-coloured counters (from the Module 1 Appendix). Students will also require the Pythagorean puzzles 1 and 2 from the Appendix in this module. (You may wish to photocopy the page of puzzles in the Appendix of the Student Module Booklet so that students may cut out these learning aids. The page can be laminated or glued to a heavy paper (card stock) first; this will make the puzzles easier to handle.)

Students need small cubes and the video program *Number Theory* from the series *Math Moves* (a compilation video is available from LRDC).

Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as TELUS.

Section 2: Assignment Answer Key (25 marks)

1. a. $6\times10^{9} = 6\,000\,000\,000$

A typical bed usually has over 6 000 000 000 dust mites. **(2 marks)**

b. $7\times10^{-3} = 0.007$

The diameter of a human hair is 0.007 cm. **(2 marks)**

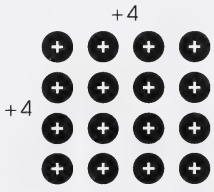
2. a. $0.000\,000\,000\,000\,031 = 3.1\times10^{-14}$

The mass of one molecule of water is 3.1×10^{-14} mg. **(2 marks)**

b. $478\,000\,000 = 4.78\times10^{8}$

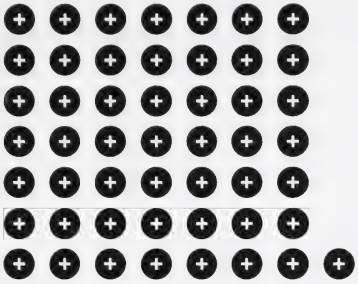
The distance from the Sun to Neptune is 4.78×10^{8} km. **(2 marks)**

3. Finding the square root is the opposite or squaring. Ask yourself, "What number multiplied by itself gives 16? Because 16 positive counters can be arranged in four rows of 4, the square root of 16 is 4. **Note:** Students could use 16 cubes or 16 squares instead of 16 counters to explain what $\sqrt{16}$ means.



(3 marks)

4. **a.** The number $\sqrt{50}$ is not a whole number because 50 is not a perfect square; 50 positive counters cannot be arranged in a square.
Note: Students could use 50 cubes or 50 squares instead of 50 positive counters.



(3 marks)

b. $\sqrt{50} \doteq 7.1$ **(1 mark)**

5. **a.** The swing time seems to be the square root of the pendulum length. **(2 marks)**

b. $\sqrt{36} = 6$

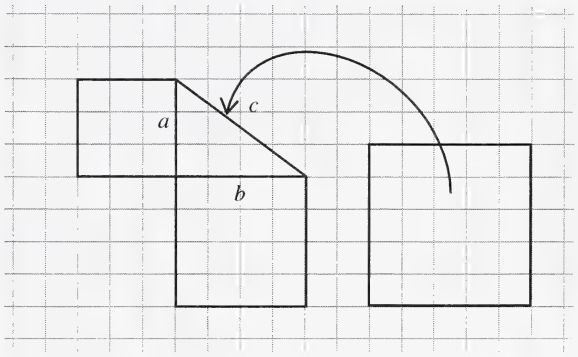
The swing time should be 6 s. **(2 marks)**

6. The square drawn on leg a has an area of 9 square units.
The square drawn on leg b has an area of 16 square units.

$16 + 9 = 25$

If you draw a square with 25 square units, it will fit on hypotenuse c.

$\therefore\ a^2 + b^2 = c^2$ **(3 marks)**



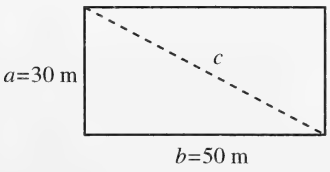
7. $a^2 + b^2 = c^2$

$30^2 + 50^2 = c^2$

$900 + 2500 = c^2$

$3400 = c^2$

$c \doteq 58.3$



Jamie walks about 58.3 m. **(3 marks)**

Final Module Assignment Answer Key (10 marks)

1.

Turkish lira / Canadian dollars

$$\frac{98\,000}{1} = \frac{980\,000}{10}$$

(×10 on both sides)

No, C$10 is equivalent to 980 000 Turkish lira; 980 000 is less than 1 000 000. **(2 marks)**

2. **a.** Answers will vary. Here is one example.

The length of my middle finger is about 9 cm.

The length of the Lilliputian's middle finger would be calculated as follows:

Step 1: Write a proportion.

Lilliputian finger:my finger

$$1 : 12 = \quad : 9$$

Step 2: Find the missing term.

Lilliputian finger:my finger

$$1 : 12$$

$$\times 0.75 \quad \times 0.75$$

$$= 0.75 : 9$$

The length of the Lilliputian's middle finger would be about 0.75 cm. **(2 marks)**

b. $1728 = 12 \times 12 \times 12 = 12^3$

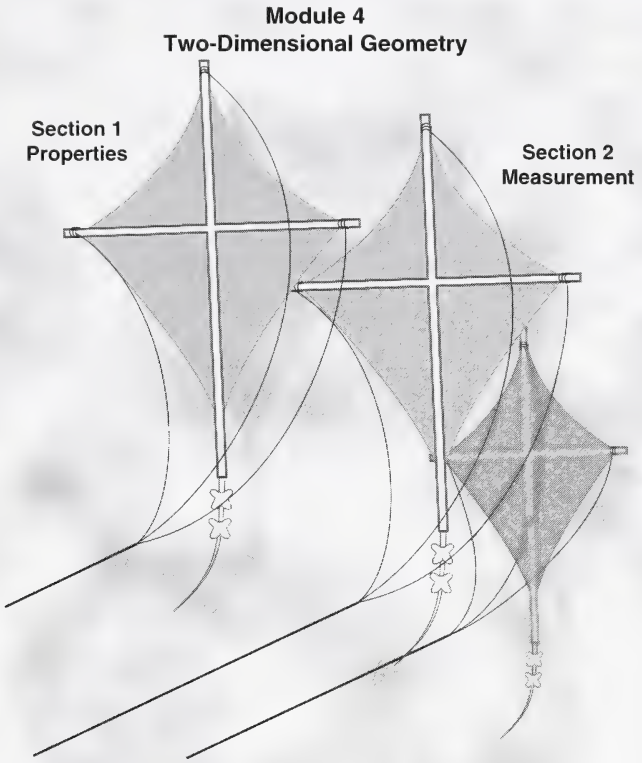
Because food has three dimensions (length, width, and height), the amount of food Gulliver required was the cube of the amount of food each Lilliputian required. **(1 mark)**

3. Answers will vary. Students should choose an appropriate scale and make a neat scale drawing. See the floor plan in Section 1, Activity 4 of the Student Module Booklet as an example. **(5 marks)**

Module 4: Two-Dimensional Geometry

Overview

In Module 4 students will explore two-dimensional geometry. They will discover the properties of plane (flat) figures and use these properties to solve problems. They will generalize measurement patterns and procedures and solve problems involving perimeter and area.



Evaluation

The evaluation of this module will be based on three assignments:

Section 1 Assignment	**52 marks**
Section 2 Assignment	**38 marks**
Final Module Assignment	**10 marks**
TOTAL	**100 marks**

Section 1: Properties

Key Concepts

- classifying polygons
- symmetry
- classifying quadrilaterals
- tessellations
- angle relations
- networks

The basic goals of this section are to ensure that students can identify the properties of plane (flat) figures and solve problems involving networks.

Gathering Materials

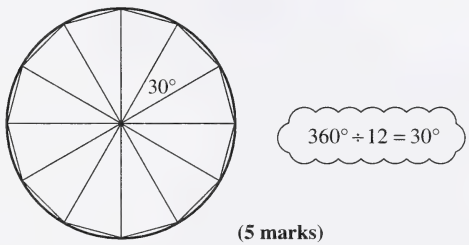
For this section, students will need a mathematical instrument set (compass, protractor, and metric ruler). Students will also require the pages of regular polygons, dot paper, and quadrilaterals from the Appendix in this module. (You may wish to photocopy these pages so that students may cut out these learning aids.) Students will also need scissors, tracing paper, lightweight plain paper, a pushpin (or tack or stick pin), and 12 toothpicks.

Students will also need the tangram from the Appendix in this module. (You may wish to photocopy this page. The page can be laminated or glued to heavy paper or card stock first; this will make the tans easier to handle.) Alternatively, you may supply commercial tans. These are available from suppliers of educational materials.

Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as TELUS.

Section 1: Assignment Answer Key (50 marks)

1. a. The regular dodecagon should look like this.



(5 marks)

b. $s = (n-2)180°$

$= (12-2)180°$

$= (10)180°$

$= 1800°$

The sum of the interior angles of a regular dodecagon is 1800°. **(2 marks)**

c. $1800 \div 12 = 150°$

Each interior angle is 150°. **(2 marks)**

d. Yes, a regular dodecagon has flip symmetry. There are 12 lines of symmetry. **(2 marks)**

e. Yes, a regular dodecagon has turn symmetry. The order of turn symmetry is 12. **(2 marks)**

f. No, a regular dodecagon does not tessellate. $150° + 150° < 360°$; $150° + 150° + 150° > 360°$. **(2 marks)**

2. **a.** rhombus **(1 mark)** **b.** square **(1 mark)** **c.** kite **(1 mark)**
d. rectangle **(1 mark)** **e.** isosceles trapezoid **(1 mark)** **f.** parallelogram **(1 mark)**

3. **a.** "I am a quadrilateral whose diagonals are equal. I am a **rectangle**, **square**, or **isosceles trapezoid**." **(1 mark)**

b. "I am a quadrilateral whose diagonals form 90° angles. I am a **rhombus**, a **square**, or a **kite**." **(1 mark)**

c. "I am a quadrilateral whose diagonals bisect each other. My opposite sides are equal in length. I am a **parallelogram**, **rhombus**, **rectangle**, or **square**." **(1 mark)**

d. "I am a quadrilateral whose diagonals are perpendicular bisectors. My diagonals are also equal in length. I am a **square**." **(1 mark)**

e. "I am a convex quadrilateral. My adjacent sides are equal in length. I am a **kite**." **(1 mark)**

f. "I am a concave quadrilateral. My adjacent sides are equal in length. I am a **dart**." **(1 mark)**

4. **a.** $x + 64° + 116° + 35° = 360°$

$x + 215° = 360°$

$x = 145°$

The sum of the angles of a quadrilateral is 360°. **(2 marks)**

b. $r = 90°$

Opposite angles of a parallelogram are equal. **(2 marks)**

c. $a + 120° = 180°$

$a = 60°$

Adjacent angles of a parallelogram are supplementary. **(2 marks)**

d. $w = 90°$

The diagonals of a square meet at right angles. **(2 marks)**

e. $x = 39°$

An inscribed angle is half the measure of a central angle subtended by the same arc. **(2 marks)**

f. $y = 36°$

Inscribed angles subtended by the same arc are equal. **(2 marks)**

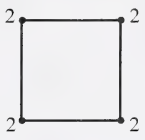
5. The right angle drawn with the square is an inscribed angle. The central angle, subtended by the same arc as this inscribed angle, is twice as big (180°).

Because the line segment *BC* is also a central angle of 180°, it is the diameter.

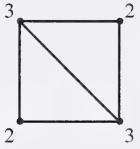
Cutting along the diameter creates two semicircles. **(2 marks)**

6.

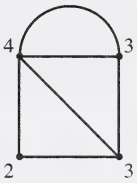
Network A



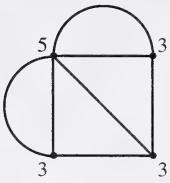
Network B



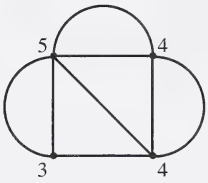
Network C



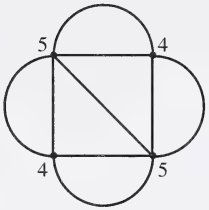
Network D



Network E

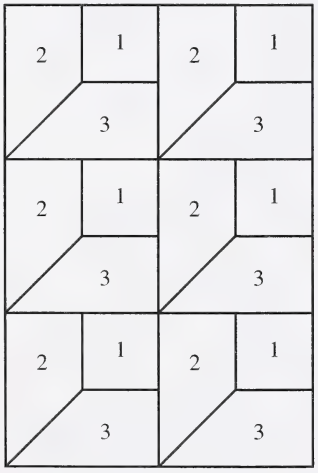


Network F



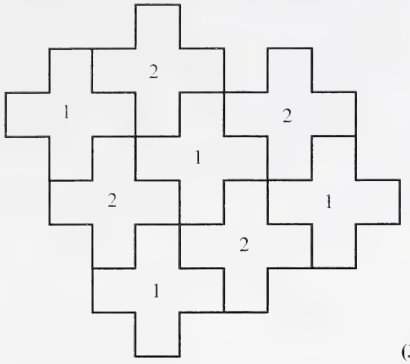
a. Networks B, C, E, and F have two odd vertices and two even vertices. **(1 mark)**
b. Network A has four even vertices. **(1 mark)**
c. Network D has four odd vertices. **(1 mark)**
d. Networks A, B, C, E, and F are traversable. **(2 marks)**

7. A minimum of three colours is required. The following is one possible answer. The numbers indicate different colours.



(3 marks)

8. A minimum of two colours is required. The following is one possible answer. The numbers indicate different colours.



(3 marks)

Section 2: Measurement

Key Concepts

- perimeter
- polygons
- circumference
- circles
- area
- composite figures

The basic goals of this section are to ensure that students can calculate the measurements of various plane figures; specifically, the perimeter of polygons, the circumference of circles, the area of polygons and circles, and the perimeter and area of composite figures.

Gathering Materials

For this section, students will need the pages with the rectangle, parallelogram, congruent triangles, congruent trapezoids, and circle from the Appendix in this module. (You may wish to photocopy these pages so that students may cut out these learning aids.) Students will also need scissors and tape.

Students may also need some string, a piece of cardboard, a small box with rectangular sides, and a pushpin (or tack or stick pin) as learning aids.

Students who wish to do the Extra Help will need some stiff paper (card stock), four paper fasteners, and a pair of scissors.

Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as TELUS.

Section 2: Assignment Answer Key (40 marks)

1. a. $P = 2\ell + 2w$

$= 2(12) + 2(3)$

$= 24 + 6$

$= 30$

The perimeter is 30 cm. **(2 marks)**

b. $P = ns$

$= 6(5)$

$= 30$

The perimeter is 30 cm. **(2 marks)**

2. **a.** $A = \ell w$

$= 12(3)$

$= 36$

The area is 36 cm^2. **(2 marks)**

b. $A = \frac{bh}{2}$

$= \frac{12(8)}{2}$

$= \frac{96}{2}$

$= 48$

The area is 48 cm^2. **(2 marks)**

c. $A = bh$

$= 16(8)$

$= 128$

The area is 128 cm^2. **(2 marks)**

d. $A = \frac{(b_1 + b_2)h}{2}$

$= \frac{(7+13)8}{2}$

$= \frac{(20)8}{2}$

$= \frac{160}{2}$

$= 80$

The area is 80 cm^2. **(2 marks)**

3. In calculating the circumference and area of the given circle, students may choose to press the π key on a calculator instead of entering the decimal approximation 3.14.

a. $C = \pi d$

$\doteq 3.14(12)$

$\doteq 37.68$

$\doteq 38$

The circumference is about 38 m. **(2 marks)**

b. $A = \pi r^2$

$\doteq 3.14\left(6^2\right)$

$\doteq 3.14(36)$

$\doteq 113.04$

$\doteq 113$

The area is about 113 m^2. **(2 marks)**

4. **a.** $P = 10 + 2(5) + 9(2)$

$= 10 + 10 + 18$

$= 38$

The perimeter is 38 cm. **(3 marks)**

b. Students may choose to use several steps to find the perimeter. Students may choose to press the π key on a calculator rather than entering the decimal approximation 3.14.

$P = \frac{\pi d}{2} + 2(6)$

$\doteq \frac{3.14(8.5)}{2} + 2(6)$

$\doteq \frac{26.69}{2} + 12$

$\doteq 13.345 + 12$

$\doteq 25.345$

$\doteq 25$

The perimeter is about 25 cm. **(3 marks)**

5. **a.** Students may choose to use several steps to find the area. Students may choose to press the π key on a calculator rather than entering the decimal approximation 3.14.

$$\begin{aligned} A &= \frac{(b_1 + b_2)h}{2} - \pi r^2 \\ &\doteq \frac{(18+45)12}{2} - 3.14\left(6^2\right) \\ &\doteq \frac{(63)12}{2} - 3.14\left(6^2\right) \\ &\doteq \frac{756}{2} - 3.14(36) \\ &\doteq 378 - 113.04 \\ &\doteq 264.96 \\ &\doteq 265 \end{aligned}$$

The shaded area is about 265 cm^2. **(3 marks)**

b. Students may choose to use several steps to find the area.

$$\begin{aligned} A &= \ell w + \frac{bh}{2} \\ &= 13(8) + \frac{4(7)}{2} \\ &= 104 + \frac{28}{2} \\ &= 104 + 14 \\ &= 118 \end{aligned}$$

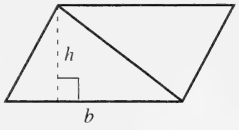
$h = 13 - 6$
$= 7$

$b = 12 - 8$
$= 4$

The shaded area is 118 cm^2. **(3 marks)**

6. The explanation and diagram should be similar to the following.

This is a diagram of a triangle and parallelogram with the same base and height.



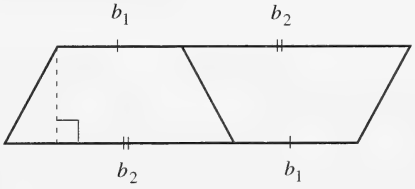
The area of a parallelogram is represented by the following formula.

$A = bh$

Because the triangle is one-half the area of a parallelogram with the same base and height, the area of the triangle is represented by the following formula.

$A = \frac{bh}{2}$ **(5 marks)**

7. The explanation and diagram should be similar to the following.



This diagram shows that you can combine two congruent trapezoids to make a parallelogram.

Because the area of the parallelogram is found by multiplying the base times the height, the area of the parallelogram can be represented by the following formula.

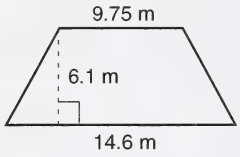
$A = (b_1 + b_2)h$

Because the area of the trapezoid is one-half the area of the parallelogram, the area of the trapezoid is represented by the following formula.

$A = \frac{(b_1 + b_2)h}{2}$ **(5 marks)**

Final Module Assignment Answer Key (10 marks)

1. To solve this problem, students may make a diagram like this.



$$A = \frac{(b_1 + b_2)h}{2}$$
$$= \frac{(9.75 + 14.6)(6.1)}{2}$$
$$= \frac{(24.34)(6.1)}{2}$$
$$= \frac{148.535}{2}$$
$$\doteq 74.3$$

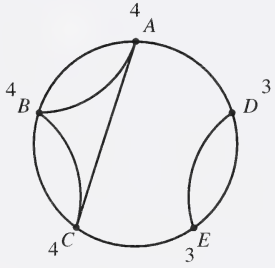
The area of the stage is about 74.3 m^2.

$74.3 \div 9 \doteq 8.3$

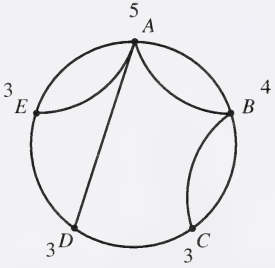
About 8.3 L of paint are needed. **(4 marks)**

2.

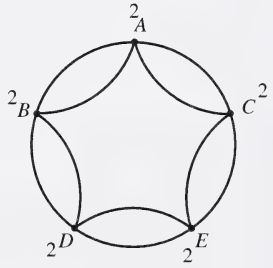
Map 1



Map 2



Map 3



a. Yes. Because there are 2 odd vertices, the network is traversable. Because there are 2 odd vertices, the paper carrier cannot begin at any vertex; the path must begin at one odd vertex and end at the other odd vertex. **(2 marks)**

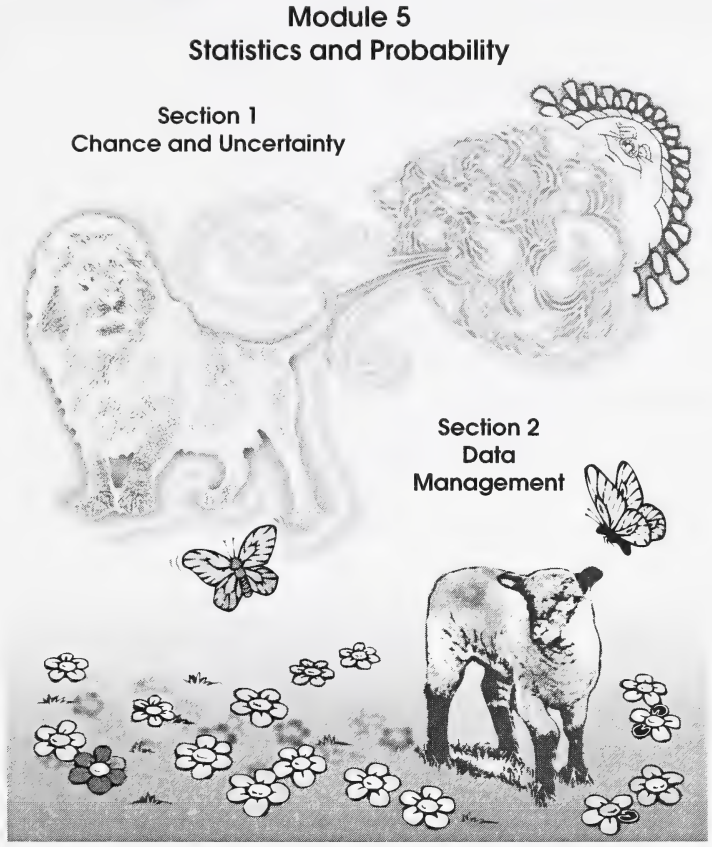
b. No. Because there are more than 2 odd vertices, the network is not traversable. **(2 marks)**

c. Yes. Because there are 0 odd vertices, the network is traversable. Because there are 0 odd vertices, the paper carrier can begin at any vertex. **(2 marks)**

Module 5: Statistics and Probability

Overview

In Module 5 students will increase their ability to work with statistics and probability. They will compare theoretical and experimental probability of independent events. They will use measures of central tendency and measures of distribution. They will develop and implement a plan for the collection and analysis of data.



Evaluation

The evaluation of this module will be based on three assignments:

Section 1 Assignment	**35 marks**
Section 2 Assignment	**40 marks**
Final Module Assignment	**25 marks**
TOTAL	**100 marks**

Section 1: Chance and Uncertainty

Key Concepts

- theoretical probability
- Monte-Carlo method
- capture-recapture method
- experimental probability
- chance
- odds

The basic goal of this section is for students to use various methods to solve problems involving probability.

Gathering Materials

Students will need a compass and protractor, paper clips, standard dice, coins, a standard deck of cards, and counters such as bingo chips or checkers.

In one question, students are asked to watch an episode of *Wheel of Fortune* on television. If students choose to do this activity, they will need access to a television.

Students who wish to use a computer for the activity on the Monte-Carlo method will require a spreadsheet program such as *ClarisWorks*™.

Students who wish to do research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an internet provider such as TELUS.

Section 1: Assignment Answer Key (35 marks)

1. a. Answers will vary, but most students will conclude that the game does not appear to be fair. The "even" person has an advantage. **(2 marks)**

b. Students may use a table, graph, or tree diagram to list the possible outcomes. Here are the possible products:

$1\times1=1$	$1\times2=2$	$1\times3=3$	$1\times4=4$	$1\times5=5$
$2\times1=2$	$2\times2=4$	$2\times3=6$	$2\times4=8$	$2\times5=10$
$3\times1=3$	$3\times2=6$	$3\times3=9$	$3\times4=12$	$3\times5=15$
$4\times1=4$	$4\times2=8$	$4\times3=12$	$4\times4=16$	$4\times5=20$

(5 marks)

c. **Step 1:** Count the number of possible products.

There are 20 products.

Step 2: Count the number of favourable products.

There are 6 favourable products.

Step 3: Calculate the theoretical probability of the product being an odd number.

$$P(odd) = \frac{\text{favourable}}{\text{possible}}$$
$$= \frac{6}{20}$$
$$= \frac{3}{10}$$

The probability of the product being an odd number is $\frac{3}{10}$. **(3 marks)**

d. **Step 1:** Count the number of possible products.

There are 20 products.

Step 2: Count the number of favourable products.

There are 14 favourable products.

Step 3: Calculate the theoretical probability of the product being an even number.

$$P(\textit{even}) = \frac{\text{favourable}}{\text{possible}}$$

The probability of the product being an even number is $\frac{7}{10}$. **(3 marks)**

e. Compare the theoretical probability of the product being even or odd.

$$\frac{7}{10} > \frac{3}{10}$$

Based on the theoretical probability, the person choosing "even" has an advantage. The student's experimental results in 1.a. should have supported this conclusion. (However, occasionally in 20 trials the person choosing "odd" will win.) **(2 marks)**

2. **a.** In each of the four suits, the queen, king, and ace are higher than a jack. Therefore, in a deck of 52 cards, there are 12 cards higher than a jack.

$$P(\textit{a card higher than a jack}) = \frac{\text{favourable}}{\text{possible}}$$
$$= \frac{12}{52}$$
$$= \frac{3}{13}$$

The probability of choosing a card higher than a jack is $\frac{3}{13}$. **(3 marks)**

b. There are two black suits—clubs and spades. The even cards are 2, 4, 6, 8, and 10. Therefore, in a deck of 52 cards, there are 10 black cards with an even number.

$$P(\textit{a black card with an even number}) = \frac{\text{favourable}}{\text{possible}}$$
$$= \frac{10}{52}$$
$$= \frac{5}{26}$$

The probability of choosing a black card with an even number is $\frac{5}{26}$. **(3 marks)**

3. $\frac{36}{200} = \frac{9}{50}$

For every 50 calls made, 9 appointments were arranged.

$$\frac{9}{50} \xrightarrow{\times 10} \frac{90}{500}$$

Using proportional reasoning, 500 calls should result in 90 appointments. **(2 marks)**

4. $\frac{6}{3000} = \frac{1}{500}$

Out of every 500 sticks tested, 1 stick was defective.

$$\frac{1}{500} = \frac{100}{50\,000}$$

Using proportional reasoning, of the 50 000 hockey sticks produced, 100 are likely to be defective. **(2 marks)**

5. Students may use a computer or probability tools.

Using a Computer

Answers will vary. Here is one solution.

Step 1: Analyse the problem and design the experiment.

The player has been getting 1 hit out of every 4 trips to the plate. Therefore, use the formula $= \text{RAND}(4)$ to simulate the strikeouts and the hits. Let 1 represent a hit. Let 2, 3, and 4 represent a strikeout.

Use 5 cells to represent the 5 trips up to bat.

Step 2: Open a new spreadsheet file. For trial 1, enter the formula $= \text{RAND}(4)$ in cells A1, B1, C1, D1, and E1.

Random numbers will appear in the first 5 cells of row 1.

Step 3: Use rows 2, 3, 4, 5, and so on for other trials. To simulate 100 trials, highlight cell A1 and shift-click on cell E100. Select "Fill Down" from under Calculate in the menu bar.

Random numbers will appear in the first 5 cells of 100 rows.

Step 4: Count the number of rows with 2 or more favourable outcomes—rows in which the numeral 1 occurs two or more times. Answers will vary. Here is one count.

Out of the 100 rows, there were 40 rows in which the numeral 1 occurred two or more times.

Step 5: Use the count in Step 4 to calculate the relative frequency. Then use the relative frequency to estimate the probability.

$$\frac{40}{100} = 0.4$$

The relative frequency was 0.4.

Based on the simulation, the probability of the player getting 2 or more hits in the next five times up to bat is about 0.4. **(10 marks)**

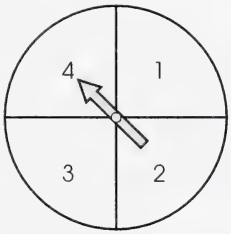
– or –

Using Probability Tools

Answers will vary. Here is one solution.

Step 1: Design the experiment.

The player has been getting 1 hit out of every 4 trips to the plate. Therefore, you can use a dial with four sectors to simulate the hits and strikeouts.



Let 1 represent a hit. Let 2, 3, and 4 represent a strikeout.

Twirl the spinner 5 times to represent each of the five trips up to bat.

Step 2: Make a chart like this.

	Outcomes				
	Spin 1	**Spin 2**	**Spin 3**	**Spin 4**	**Spin 5**
Trial 1					
Trial 2					
Trial 3					

Step 3: For trial 1, twirl the spinner on the dial five times (once for every time up to bat). Record the results in the table. Repeat for trials 2, 3, and so on.

	Outcomes				
	Spin 1	**Spin 2**	**Spin 3**	**Spin 4**	**Spin 5**
Trial 1	3	1	3	4	2
Trial 2	4	2	1	1	3
Trial 3	2	4	2	1	4

Step 4: Count the number of trials with favourable outcomes—trials in which the spinner landed on numeral 1 at least twice. Answers will vary. Here is one count.

In 50 trials, there were 20 favourable outcomes.

Step 5: Use the count in Step 4 to calculate the relative frequency. Then use the relative frequency to estimate the probability.

$$\frac{20}{50} = 0.4$$

The relative frequency was 0.4.

Based on the simulation, the probability of the player getting 2 or more hits in the next five times up to bat is about 0.4. **(10 marks)**

Section 2: Data Management

Key Concepts

- mean
- median
- mode
- quartiles
- extremes
- range
- interquartile range
- box and whisker plot

The basic goals of this section are to ensure that students can collect, analyse, and display data.

Gathering Materials

For this section, students will need a scientific calculator and graph paper. They will also need the two puzzles found in the Appendix of this module. (You may wish to photocopy the pages of puzzles.)

Students may wish to use blocks, such as base ten blocks, as a learning aid. Students may use the base ten blocks provided in the Appendix of Module 5, or they may use commercial base ten blocks (available from LRDC or commercial outlets).

Students require a computer and a spreadsheet program such as *ClarisWorks*™, *Microsoft® Works*, or *Microsoft® Excel*.

Students who wish to do research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as TELUS.

Section 2: Assignment Answer Key (40 marks)

1. a. Answers will vary. Students should be evaluated on their reasoning. Ideas may include the following:

Experiments may have been conducted to determine how much energy each of the electrical devices consume when in use. Surveys may also have been conducted to determine how frequently families use these electrical devices and what each family's yearly electrical bill is. The statistics may then have been determined using the results of the experiments and the surveys. **(3 marks)**

b. The stove consumes the least energy in a year and therefore is the least expensive to operate. **(2 marks)**

c. The furnace consumes the most energy in a year and therefore is the most expensive to operate. **(2 marks)**

d. $393 - 67 = 326$

The range is $326. **(2 marks)**

e. $$\frac{393 + 232 + 70 + 142 + 86 + 67}{6} = \frac{990}{6} = 165$$

The mean is $165. **(2 marks)**

f. **Step 1:** List the data in ascending order.

67, 70, 86, 142, 232, 393

Step 2: Find the average of the middle two numbers.

$$\frac{86 + 142}{2} = 114$$

The median is $114. **(2 marks)**

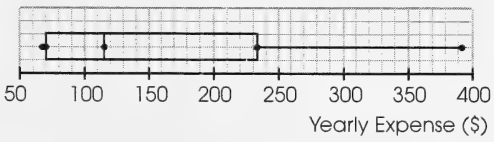
2. **Step 1:** List the data in ascending order and find the median, quartiles, and extremes.

$$67, (70), 86, \mid 142, (232), 393$$

Median: $\frac{86 + 142}{2} = 114$

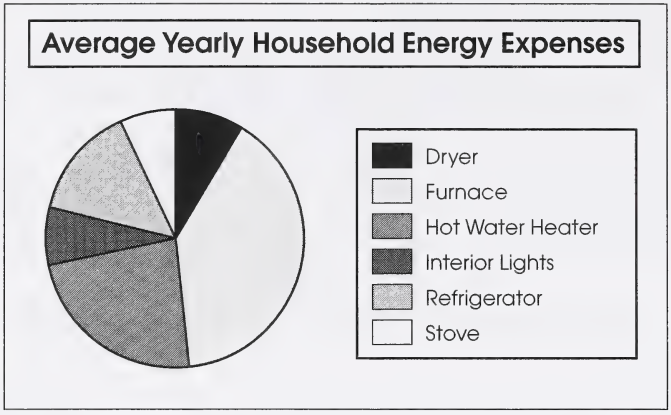
Lower Quartile: 70
Upper Quartile: 232
Lower Extreme: 67
Upper Extreme: 393

Step 2: Construct the box and whisker plot. **Note:** Students should select an appropriate kind of graph paper and scale. Scales may vary. Here is one example.



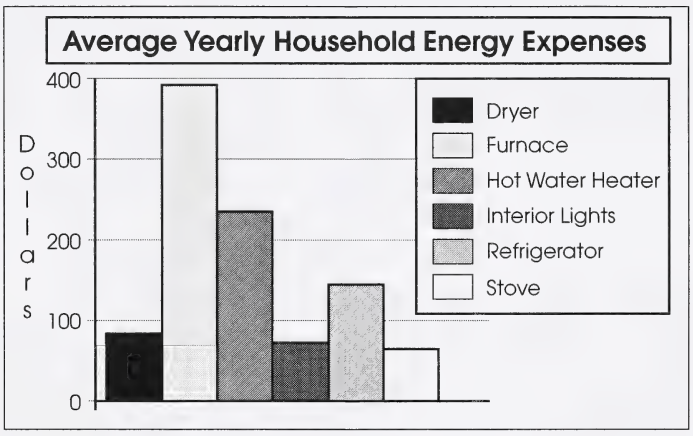
(3 marks)

3. a. If students use *ClarisWorks*™, the graphs should look similar to the following. Hand-drawn graphs will be similar.



(5 marks)

b. If students use *ClarisWorks*™, the graphs should look like the following. Hand-drawn graphs will look similar.



(3 marks)

4. a. $\frac{500 + 2 \times 700 + 200 + 9 \times 100 + 600 + 50}{15} \doteq 243$

The mean is about 243 cars per hour. **(2 marks)**

b. Arrange the data in ascending order and find the middle number. **Note:** Students may use a stem and leaf plot to do this or they may use a list.

Stem	Leaf
5	0
10	0, 0, 0, 0, 0, 0, 0, 0, 0
20	0
30	
40	
50	0
60	0
70	0, 0

median

The median is 100 cars per hour. **(2 marks)**

c. The mode is 100 cars per hour. **(2 marks)**

d. The median or mode are the best measures of central tendency because they are the least affected by the heavy traffic in the morning and evening rush hours. **(2 marks)**

5. Methods and answers will vary. Here is one solution.

Step 1: Calculate the total of the sizes if the mean size is 7.

Let t represent the total of the sizes.

$$\text{mean} = \frac{\text{total}}{\text{number of pairs of shoes}}$$

$$7 = \frac{t}{9}$$

$$9(7) = 9\left(\frac{t}{9}\right)$$

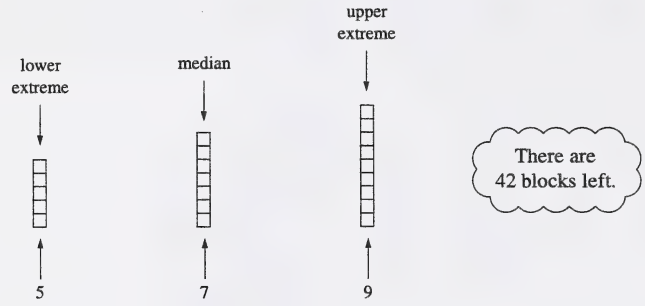
$$63 = t$$

The total of the sizes is 63.

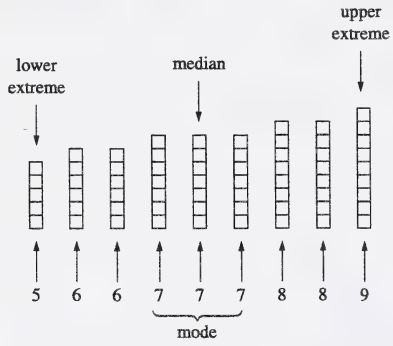
Step 2: Gather blocks to represent the total of the sizes.

You will need 63 blocks.

Step 3: Use some of the 63 blocks to represent the shoe sizes of three of the nine pairs of shoes. Keep in mind the median size is 7 and the extremes are 5 and 9.



Step 4: Use the remaining 42 blocks to represent the shoe sizes of the other six pairs of shoes. Keep in mind the median size is 7 and the mode is 7.



A set of data that has the given statistics is 5, 6, 6, 7, 7, 7, 8, 8, and 9. **(4 marks)**

6. a. $46 \times 1.25 = 57.5$

The mean amount collected is \$57.50.

$47 \times 1.25 = 58.75$

The median amount collected is \$58.75. **(2 marks)**

b. $46 + 20 = 66$

The mean number of passengers is 66.

$47 + 20 = 67$

The median number is 67 passengers. **(2 marks)**

Final Module Assignment Answer Key (25 marks)

1. a. Answers will vary. Evaluate students on these points.

- Questions are clearly worded.
- Questions are worded in a manner so that they do not encourage people to give a particular answer.
- Questions are sensitive to personal and cultural beliefs.
- The questionnaire is not too long.

(5 marks)

b. Answers will vary. Evaluate the students on these points.

- The method is practical.
- The method is not biased (it uses random sampling, for example).
- The method is appropriate.

(3 marks)

c. Sarah could use the range or the interquartile range to describe the distribution of the set of data she collects. **(1 mark)**

d. Sarah could use the mean, median, or mode to describe the central tendency of the set of data she collects. **(1 mark)**

e. Sarah could make a stem and leaf plot to help her visualize any custers or gaps in the data. **(1 mark)**

2. Answers will vary. Here are sample responses.

a. The store owner would use the mode to decide what sizes of shoes to order because this statistic shows what sizes of shoes sell the most. **(1 mark)**

b. Bowlers comparing the average scores of team members would use the mean because it is customary to use this statistic in bowling. **(1 mark)**

c. A teacher reporting the average score on a test would use the median because this score is less affected than the mean by a very high or very low score in the class. **(1 mark)**

3. Answers will vary. Evaluate the students on the basis of their communication and reasoning.

a. Are graphs and charts presented?
Are graphs and charts legible and clear (e.g., large enough)?
Is the type of chart or graph used appropriate for the data being presented? **(3 marks)**

b. Are data valid?
What method was used to collect the data?
How accurate are the data (are the limits of accuracy given)?
Are data current?
Is the source of the data given? **(3 marks)**

4. Answers will vary. Here is one solution.

Step 1: Make a table like this.

	Number of Red Jellybeans in Sample
Trial 1	
Trial 2	
Trial 3	

Step 2: Wearing gloves so as not to contaminate the jellybeans, randomly select 20 jellybeans. (Do not look when picking the jellybeans.) Count the number of red jellybeans and record the number in the table. Then return the jellybeans to the jar.

Step 3: Repeat Step 2 several times.

Step 4: Calculate the average number of red jellybeans in a sample of 20.

Step 5: Use proportional reasoning to estimate the total number of red jellybeans.

For example, if there was an average of 3 red jellybeans in each sample, you would conclude that there are 150 red jellybeans in the jar.

(5 marks)

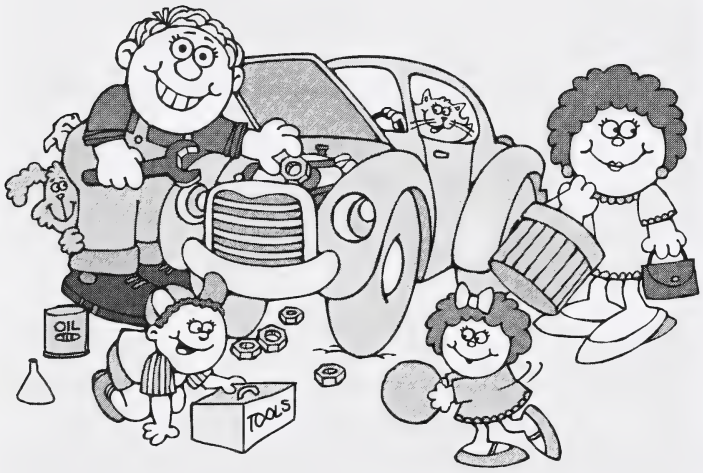
$$\frac{3}{20} \overset{\times 50}{=} \frac{150}{1000}$$

Module 6: Three-Dimensional Geometry

Overview

In Module 6 students will increase their spatial sense by investigating the properties of three-dimensional shapes and by calculating the volume and surface area of three-dimensional shapes.

Module 6
Three-Dimensional Geometry



Section 1
Properties of
Three-Dimensional Shapes

Section 2
Measurement of
Three-Dimensional Shapes

Evaluation

The evaluation of this module will be based on three assignments:

Section 1 Assignment	**40 marks**
Section 2 Assignment	**45 marks**
Final Module Assignment	**15 marks**
TOTAL	**100 marks**

Section 1: Properties of Three-Dimensional Shapes

Key Concepts

- polyhedron
- solid
- vertex
- net
- axis of symmetry
- edge
- shell
- plane of symmetry
- face
- skeleton
- cross section

The basic goals for this section are to ensure that students can build models of polyhedra. They will build shells of polyhedra using nets. They will build skeletons of polyhedra using plastic drinking straws and pipe cleaners or using toothpicks and mini-marshmallows. They will build solids using Plasticine™ or modelling clay. They will use these models to discover properties of polyhedra and classify polyhedra.

Gathering Materials

Students will need a mathematical instrument set (compass, metric ruler, and protractor). They will need scissors, card stock, tape, Plasticine™ (or modelling clay), plastic drinking straws, toothpicks, pipe cleaners, mini-marshmallows, string, and the nets found in the Appendix of the Student Module Booklet (the pages should be glued to heavy paper or card stock before they are cut out). They will need objects such as a can of soup and a conical party hat (or a conical paper cup).

Students who wish to do research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as TELUS.

Section 1: Assignment Answer Key (40 marks)

1. C **(2 marks)**

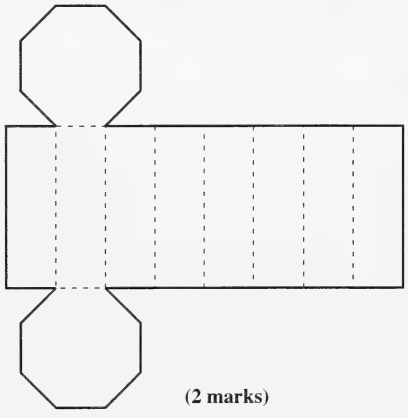
2. A **(2 marks)**

3. A **(2 marks)**

4. D **(2 marks)**

5. **a.** The polyhedron is an octagonal prism. **(2 marks)**

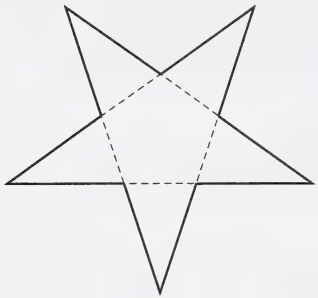
b.



(2 marks)

6. **a.** The polyhedron is a pentagonal pyramid. **(2 marks)**

b.



7. The number of edges is two less than the number of faces and vertices. **(2 marks)**

$$\begin{aligned} e &= f + v - 2 \\ 17 &= f + 12 - 2 \\ 17 &= f + 10 \\ -10 \quad &\quad -10 \\ \hline 7 &= f \end{aligned}$$

The polyhedron has 7 faces. **(2 marks)**

8. **a.** In a prism the number of edges is three times the number of sides on its base.

$$3 \times 7 = 21$$

So, 21 toothpicks are needed. **(2 marks)**

b. In a prism the number of vertices is twice the number of sides on its base.

$$2 \times 7 = 14$$

So, 14 mini-marshmallows are needed. **(2 marks)**

9. **a.** In a pyramid the number of edges is twice the number of sides on the base.

$$2 \times 10 = 20$$

So, 20 toothpicks are needed. **(2 marks)**

b. In a pyramid the number of vertices is one more than the number of sides on the base.

$$10 + 1 = 11$$

So, 11 mini-marshmallows are needed. **(2 marks)**

10. **a.** The shape is a rectangle. **(2 marks)** **b.** The shape is a circle. **(2 marks)**

11. **a.** The shape is a triangle. **(2 marks)** **b.** The shape is a square. **(2 marks)**

12. Each cross section is a circle. **(2 marks)**

13. No, the top half of the cone is not symmetrical with the bottom half. **(2 marks)**

14. Yes, the line goes through the apex and the centre of the square base. If the pyramid is turned about this axis, the image of the square pyramid will fit onto itself more than once in a full turn. **(2 marks)**

Section 2: Measurement of Three-Dimensional Shapes

Key Concepts

- volume
- surface area

The basic goals for this section are to ensure that students can generalize measurement patterns and procedures and solve problems involving volume and surface area.

Gathering Materials

Students will need the video programs *Volumes* and *Areas (of Circles and Cylinders)* from the series *Mathways*. They will need a calculator.

Students who wish to do research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as TELUS.

Section 2: Assignment Answer Key (45 marks)

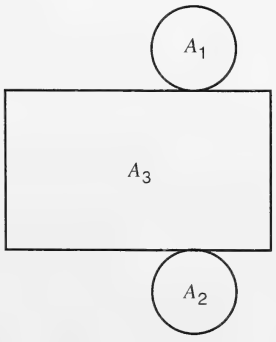
1. a. **Step 1:** Calculate the volume. If the diameter is 8 m, the radius is 4 m.

$$B = \pi r^2 \qquad V = BH$$
$$\doteq 3.14(4)^2 \qquad \doteq 50.24(15.0)$$
$$\doteq 3.14(16) \qquad \doteq 753.6$$
$$\doteq 50.24$$

The volume is about $753.6\ \text{m}^3$.

Step 2: Calculate the surface area.

The surface area is the sum of areas A_1, A_2, and A_3. **Note:** $A_1 = A_2$. A_3 is the area of a rectangle with the length equal to the circumference of the base and the width equivalent to the height of the prism.



$$A_1 = \pi r^2$$
$$\doteq 3.14\left(4^2\right)$$
$$\doteq 3.14(16)$$
$$\doteq 50.24$$

$$A_3 = \ell w$$
$$\doteq 25.12(15)$$
$$\doteq 376.8$$

πd
$\doteq 3.14(8)$
$\doteq 25.12$

$$\therefore\ 2(A_1) + A_3 \doteq 2(50.24) + 376.8$$
$$\doteq 100.48 + 376.8$$
$$\doteq 477.28$$
$$\doteq 477.3$$

The surface area is about 477.3 m^2. **(6 marks)**

Note: Alternatively, students may use the formula $SA = 2B + CH$ to calculate the surface area.

b. **Step 1:** Calculate the volume.

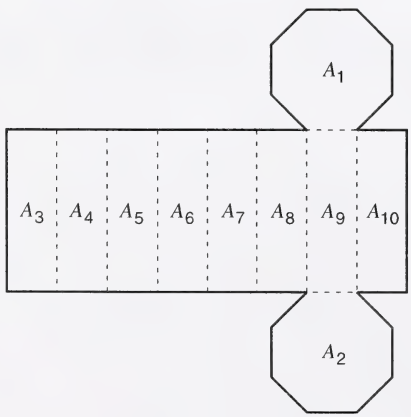
$$B = \frac{nsa}{2}$$
$$= \frac{8(7)(9)}{2}$$
$$= \frac{504}{2}$$
$$= 252$$

$$V = BH$$
$$= 252(40)$$
$$= 10\,080$$

The volume is 10 080 cm^3.

Step 2: Calculate the surface area.

The surface area is the sum of areas $A_1, A_2, A_3, A_4, A_5, A_6, A_7, A_8, A_9$, and A_{10}. **Note:** $A_1 = A_2$; $A_3 = A_4 = A_5 = A_6 = A_7 = A_8 = A_9 = A_{10}$.



$$A_1 = \frac{nsa}{2} \qquad A_3 = \ell w$$
$$= \frac{8(7)(9)}{2} \qquad = 40(7)$$
$$= \frac{504}{2} \qquad = 280$$
$$= 252$$

$$\therefore\ 2(A_1) + 8(A_3) = 2(252) + 8(280)$$
$$= 504 + 2240$$
$$= 2744$$

The surface area is 2744 cm^2. **(6 marks)**

Note: Alternatively, students may use the formula $SA = 2B + PH$.

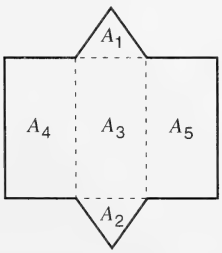
c. **Step 1:** Calculate the volume.

$$B = \frac{bh}{2} \qquad V = BH$$
$$= \frac{24(9)}{2} \qquad = 108(30)$$
$$= \frac{216}{2} \qquad = 3240$$
$$= 108$$

The volume is 3240 mm^3. **(6 marks)**

Step 2: Calculate the surface area.

The surface area is the sum of areas A_1, A_2, A_3, A_4, and A_5. **Note:** $A_1 = A_2$; $A_4 = A_5$.



$$A_1 = \frac{bh}{2} \qquad A_3 = \ell w \qquad A_4 = \ell w$$
$$= \frac{24(9)}{2} \qquad = 30(24) \qquad = 30(15)$$
$$= \frac{216}{2} \qquad = 720 \qquad = 450$$
$$= 108$$

$$\therefore\ 2(A_1)+A_3+2(A_4) = 2(108)+720+2(450)$$
$$= 216+720+900$$
$$= 1836$$

The surface area is $1836\ \text{mm}^2$.

2. a. The base of the cake is a square $30\ \text{cm} \times 30\ \text{cm}$.

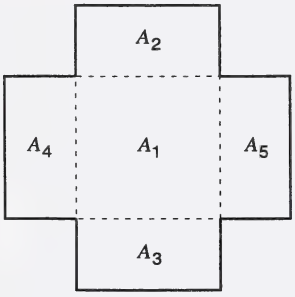
$B = s^2$ $\quad$ $V = BH$

$= 30^2$ $\quad$ $= 900(10)$

$= 900$ $\quad$ $= 9000$

The volume of the cake is $9000\ \text{cm}^3$. **(3 marks)**

b. Calculate the surface area of the iced portion of the cake. The surface area of the iced portion of the cake is the sum of areas A_1, A_2, A_3, A_4, and A_5. **Note:** $A_2 = A_3 = A_4 = A_5$.



$A_1 = s^2$ $\quad$ $A_2 = \ell w$

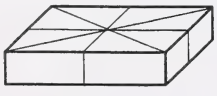
$= 30^2$ $\quad$ $= 30(10)$

$= 900$ $\quad$ $= 300$

$$\therefore\ A_1+4(A_2) = 900+4(300)$$
$$= 900+1200$$
$$= 2100$$

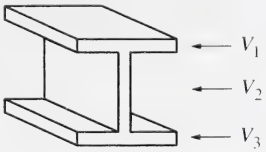
The surface area of the iced portion is $2100\ \text{cm}^2$. **(4 marks)**

c. Cut the cake in half vertically, horizontally, and diagonally.



(3 marks)

3. The volume is the sum of the volumes. $V_1 = V_2 = V_3$



$10 + 5 + 10 = 25$

$B_1 = \ell w$
$= 30(25)$
$= 750$

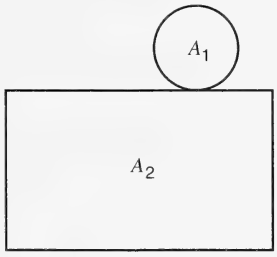
$V_1 = B_1 H_1$
$= 750(5)$
$= 3750$

$\therefore\ 3(V_1) = 3(3750)$
$= 11\,250$

The volume is 11 250 cm^3. **(5 marks)**

4. **Step 1:** Calculate the area of the painted surfaces.

The area of the painted surfaces is the sum of areas A_1 and A_2.



$A_1 = \pi r^2$
$\doteq 3.14\left(2.5^2\right)$
$\doteq 3.14(6.25)$
$\doteq 19.625$

$A_2 = \ell w$
$\doteq 15.7(5.8)$
$\doteq 91.06$

$C = \pi d$
$\doteq 3.14(5.0)$
$\doteq 15.7$

$\therefore\ A_1 + A_2 \doteq 19.625 + 91.06$
$\doteq 110.685$
$\doteq 110.7$

The surface area is about 110.7 m^2.

Step 2: Calculate the amount of paint required.

$$110.7 \div 12 \doteq 9.2$$
$$\doteq 10$$

Because you need more than 9 L of paint, you must round the number of litres up to the next whole litre.

About 10 L of paint is required. **(5 marks)**

5. a. The volume of paper towelling is equal to the outside volume minus the volume of the hollow tube.

Step 1: Calculate the outer volume. If the diameter is 12 cm, the radius is 6 cm.

$$B = \pi r^2 \qquad V = BH$$
$$\doteq 3.14(6)^2 \qquad \doteq 113.04(30)$$
$$\doteq 3.14(36) \qquad \doteq 3391.2$$
$$\doteq 113.04$$

The outer volume is about 3391.2 cm^3.

Step 2: Calculate the volume of the hollow tube. If the diameter is 3 cm, the radius is 1.5 cm.

$$B = \pi r^2 \qquad V = BH$$
$$\doteq 3.14(1.5)^2 \qquad \doteq 7.065(30)$$
$$\doteq 3.14(2.25) \qquad \doteq 211.95$$
$$\doteq 7.065 \qquad \doteq 212.0$$

The volume of the hollow tube is about 212.0 cm^3.

Step 3: Find the volume of paper towelling.

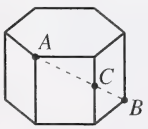
$$V_1 - V_2 \doteq 3391.2 - 212.0$$
$$\doteq 3179.2$$

The volume of paper towelling is about 3179.2 cm^3. **(5 marks)**

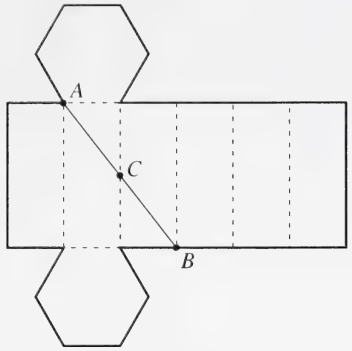
b. Answers will vary. Having a tube with a larger diameter makes the volume of paper towelling look greater. **(2 marks)**

Final Module Assignment Answer Key (15 marks)

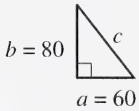
1. The shortest path is shown on the following sketch.



To calculate the distance students may sketch a net and the path. Then they may use the Pythagorean relation to calculate the length of the path.



$$a^2 + b^2 = c^2$$
$$80^2 + 60^2 = c^2$$
$$6400 + 3600 = c^2$$
$$10\,000 = c^2$$
$$100 = c$$



30 + 30 = 60

The length of the shortest path is 100 cm. **(4 marks)**

2. a. The area of the painted surfaces of the first layer of the second tower is 5 cm^2.

The area of the painted surfaces of the second layer of the second tower is 11 cm^2.

$5 + 11 = 16$

The area of the painted surfaces of the second tower is 16 cm^2. **(2 marks)**

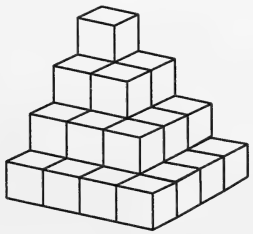
b. The area of the painted surfaces of the first and second layers of the third tower is 16 cm^2.

The area of the painted surfaces of the third layer of the third tower is 17 cm^2.

$16 + 17 = 33$

The area of the painted surfaces of the third tower is 33 cm^2. **(2 marks)**

c. The fourth tower will look like this.



(2 marks)

d. The area of the painted surfaces of the first, second, and third layers of the fourth tower is 33 cm^2.

The area of the painted surfaces of the fourth layer of the fourth tower is 23 cm^2.

$33 + 23 = 56$

The area of the painted surfaces of the fourth tower is 56 cm^2. **(2 marks)**

3. **Step 1:** Determine the number of bricks in the wall.

The top layer and the bottom layer each have 2 rows of 5 bricks. This is a total of 20 bricks.

The middle row has 9 whole bricks and 2 half-bricks. This is a total of 10 bricks.

The wall has a total of 30 bricks.

$20 + 10 = 30$

Step 2: Calculate the volume of one brick.

$B = \ell w$ $\quad V = BH$

$= 8(10)$ $\quad = 80(20)$

$= 80$ $\quad = 1600$

One brick has a volume of 1600 cm^3.

Step 3: Calculate the volume of 30 bricks.

$30 \times 1600 = 48\,000$

The wall has a volume of 48 000 cm^3. **(3 marks)**

Final Test

Security
Included here is the answer key to the Final Test and the student's copy of the Final Test. Teachers should keep these secure against unauthorized student access. Students should not have access to the test until it is assigned in a supervised situation. The answers should be stored securely and retained by the teacher at all times.

Convenience
The student's copy of the Final Test is designed for photocopying and faxing.

MATHEMATICS 8

FINAL TEST ANSWER KEY

Part 1: Number (25 marks)

1. **a.** $0.000\,102 = 1.02 \times 10^{-4}$

Gold can be hammered into sheets as thin as 1.02×10^{-4} mm. **(1 mark)**

b. $1.6 \times 10^{-5} = 0.000\,016$

One second is 0.000 016 of a day. **(1 mark)**

2. iron:chromium:nickel

$74 : 18 : 8$

$= 37 : 9 : 4$

The ratio of iron to chromium to nickel is 37: 9: 4. **(1 mark)**

3. angle 1:angle 2:angle 3

$1 : 2 : 3$

$\times 30 \quad \times 30 \quad \times 30$

$= 30 : 60 : 90$

The angles are 30°, 60°, and 90°. **(2 marks)**

4. $2.5\% \times 8000$

$= 0.025 \times 8000$

$= 200$

Of the offspring, 200 survive the trip. **(2 marks)**

5. $\frac{1}{30}\% = \frac{1}{30} \div 100$

$= \frac{1}{30} \times \frac{1}{100}$

$= \frac{1}{3000}$

About $\frac{1}{3000}$ of all water on Earth evaporates each year. **(1 mark)**

6. **Method 1: Using Two Steps**

$125\% \times 60$ $\quad 60 + 75 = 135$

$= 1.25 \times 60$

$= 75$

The selling price is \$135.

Method 2: Using One Step

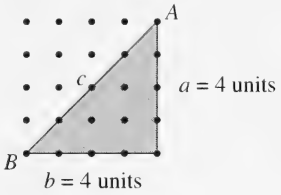
$225\% \times 60$

$= 2.25 \times 60$ $\quad$ 100% + 125% = 225%

$= 135$

The selling price is \$135. **(2 marks)**

7. **a.** Make a right triangle and use the Pythagorean relation to find the length of the line segment.



$a^2 + b^2 = c^2$

$4^2 + 4^2 = c^2$

$16 + 16 = c^2$

$32 = c^2$

$\therefore c = \sqrt{32}$

The length is $\sqrt{32}$ units. **(1 mark)**

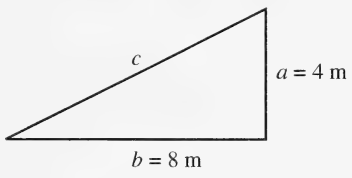
b. Use a calculator to find the decimal approximation. Then round to the nearest hundredth.

$\sqrt{32} = 5.656\,854\,249\cdots$

$\doteq 5.66$

The length of AB is about 5.66 units. **(1 mark)**

8. **Step 1:** Use the Pythagorean relation to find the length of the pole above the break. Round the answer to the nearest tenth.



$a^2 + b^2 = c^2$

$4^2 + 8^2 = c^2$

$16 + 64 = c^2$

$80 = c^2$

$\therefore c = \sqrt{80}$

$\doteq 8.9$

The length of the pole above the break is 8.9 m.

Step 2: Find the total height of the pole.

$8.9 + 4 = 13.9$

Before the break, the pole was about 13.9 m high. **(3 marks)**

9. **Method 1: Using Multiplication**

Each friend received $\frac{1}{4}$ of the left-over cake.

$$\frac{1}{4}\times\frac{2}{3}=\frac{2}{12}$$
$$=\frac{1}{6}$$

Each friend received $\frac{1}{6}$ of the whole cake.

Method 2: Using Division

$$\frac{2}{3}\div 4=\frac{2}{3}\times\frac{1}{4}$$
$$=\frac{2}{12}$$
$$=\frac{1}{6}$$

Each friend received $\frac{1}{6}$ of the whole cake. **(2 marks)**

10. **a.** $\frac{5}{6}\times 24=\frac{5\times\cancel{24}^{4}}{\cancel{6}_{1}}$

$$=\frac{20}{1}$$
$$=20$$

Barbara has \$20. **(2 marks)**

b. $1\frac{3}{4}\times 24=\frac{7}{4}\times 24$

$$=\frac{7\times\cancel{24}^{6}}{\cancel{4}_{1}}$$
$$=\frac{42}{1}$$
$$=42$$

Carla has \$42. **(2 marks)**

11. **Method 1: Subtracting Vertically**

$$\begin{array}{r} 8\frac{3}{5} \\ -\ 4\frac{1}{3} \\ \hline \end{array} = \begin{array}{r} 8\frac{9}{15} \\ -\ 4\frac{5}{15} \\ \hline 4\frac{4}{15} \end{array}$$

Sirius is $4\frac{4}{15}$ light-years farther than Alpha Centauri.

Method 2: Subtracting Horizontally

$$8\frac{3}{5}-4\frac{1}{3}=\frac{43}{5}-\frac{13}{3}$$
$$=\frac{129}{15}-\frac{65}{15}$$
$$=\frac{64}{15}$$
$$=4\frac{4}{15}$$

Sirius is $4\frac{4}{15}$ light-years farther than Alpha Centauri. **(2 marks)**

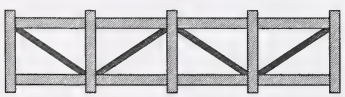
12. $-48.8-6.7=-48.8+(-6.7)$

$$=-55.5$$

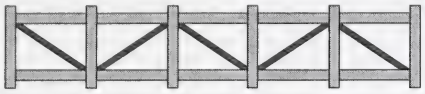
The temperature change was $-55.5°\,\text{C}$. That is, the temperature dropped 55.5°C. **(2 marks)**

Part 2: Patterns and Relations (25 marks)

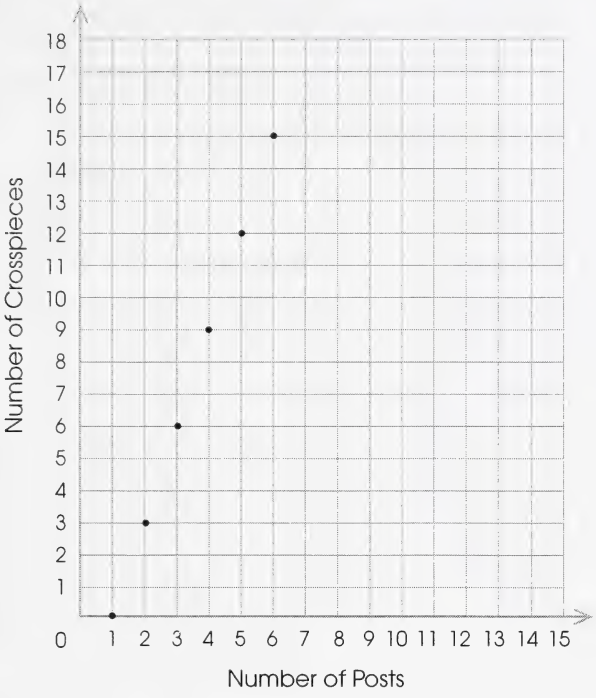
1. **a.** Use patterns to solve this problem. For a fence with 5 posts, 12 crosspieces would be needed.



b. Use patterns to solve this problem. For a fence with 6 posts, 15 crosspieces would be needed.



c.



Note: Students may or may not choose to put a dot at (1, 0). The dots should not be connected because it not possible to have fractional posts and crosspieces.

(3 marks)

d. Let c represent the number of crosspieces.
Let p represent the number of posts.

$c = 3p - 3$ **(2 marks)**

e. $c = 3p - 3$
$= 3(10) - 3$
$= 30 - 3$
$= 27$

For a fence with 10 posts, 27 crosspieces are needed. **(2 marks)**

2. a.

$$\frac{x}{2} = -3$$

$$2\left(\frac{x}{2}\right) = 2(-3)$$

$$x = -6$$

LS	RS
$\frac{x}{2}$	-3
$= \frac{(-6)}{2}$	
$= -3$	

LS = RS **(2 marks)**

b.

$$5x - 1 = 9$$

$$+1 \quad +1$$

$$\frac{5x}{5} = \frac{10}{5}$$

$$x = 2$$

LS	RS
$5x - 1$	9
$= 5(2) - 1$	
$= 10 - 1$	
$= 9$	

LS = RS **(2 marks)**

c.

$$\frac{x}{3} + 2 = -4$$

$$-2 \quad -2$$

$$\frac{x}{3} = -6$$

$$3\left(\frac{x}{3}\right) = 3(-6)$$

$$x = -18$$

LS	RS
$\frac{x}{3} + 2$	-4
$= \frac{(-18)}{3} + 2$	
$= -6 + 2$	
$= -4$	

LS = RS **(2 marks)**

3. Let n represent the number of cards in a pack.

$$3n + 5 = 35$$

$$-5 \quad -5$$

$$\frac{3n}{3} = \frac{30}{3}$$

$$n = 10$$

There were 10 cards in each pack Joe purchased. **(3 marks)**

4. Let c represent the number of candies Hans started with.

$$\frac{c}{2} - 7 = 23$$

$$+7 \quad +7$$

$$\frac{c}{2} = 30$$

$$2\left(\frac{c}{2}\right) = 2(30)$$

$$c = 60$$

Hans started with 60 candies. **(3 marks)**

5. $c = g - \frac{h}{150}$

$= 24 - \frac{1500}{150}$

$= 24 - 10$

$= 14$

The temperature in the cargo hold is 14°C. **(2 marks)**

Part 3: Shape and Space (23 marks)

1. a. $A = bh$

$= 14.6(7.2)$

$= 105.12$

$\doteq 105.1$

The garden in the shape of a parallelogram has an area of about 105.1 m^2. **(2 marks)**

b. $A = \frac{(b_1 + b_2)h}{2}$

$= \frac{(18.1 + 10.4)7.1}{2}$

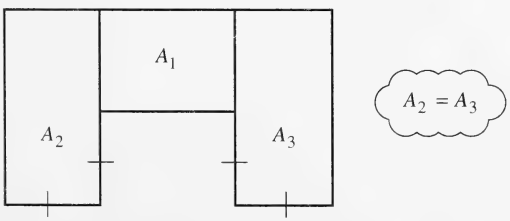
$= \frac{(28.5)7.1}{2}$

$= 101.175$

$\doteq 101.2$

The garden in the shape of a trapezoid has an area of about 101.2 m^2. **(2 marks)**

2. The figure is made up of three rectangles. **Note:** $A_2 = A_3$.



$A_1 = \ell w$ $\quad$ $A_2 = \ell w$ $\quad$ $\therefore A_3 = 8$

$= 3(2)$ $\quad$ $= 2(4)$ $\quad$ and

$= 6$ $\quad$ $= 8$ $\quad$ $A_1 + A_2 + A_3 = 6 + 8 + 8$

$= 22$

The area of the composite figure is 22 m^2. **(2 marks)**

3. 1 cm represents 10 m.
$\therefore$ 4 cm represents 40 m.

Each side of the palisade is 40 m.

$$\begin{aligned} P &= 4s \\ &= 4(40) \\ &= 160 \end{aligned}$$

The perimeter of the palisade is 160 m. **(2 marks)**

4. **a.**
$$\begin{aligned} B &= \pi r^2 \\ &\doteq 3.14\left(5^2\right) \\ &\doteq 3.14(25) \\ &\doteq 78.5 \end{aligned}$$

$$\begin{aligned} V &= BH \\ &\doteq 78.5(12) \\ &\doteq 942 \end{aligned}$$

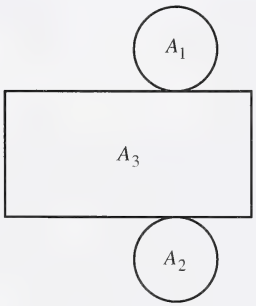
The cylinder has a volume of about 942 cm^3. **(2 marks)**

$$\begin{aligned} B &= \frac{bh}{2} \\ &= \frac{10.0(8.7)}{2} \\ &= \frac{87}{2} \\ &= 43.5 \end{aligned}$$

$$\begin{aligned} V &= BH \\ &= 43.5(12.0) \\ &= 522 \end{aligned}$$

The triangular prism has a volume of 522 cm^3. **(2 marks)**

b. The surface area of the cylinder is the sum of these areas. **Note:** $A_1 = A_2$



$$\begin{aligned} A_1 &= \pi r^2 \\ &\doteq 3.14(5.0)^2 \\ &\doteq 3.14(25) \\ &\doteq 78.5 \end{aligned}$$

$$\begin{aligned} A_3 &= \ell w \\ &\doteq 31.4(12.0) \\ &\doteq 376.8 \end{aligned}$$

$$\begin{aligned} C &= \pi d \\ &\doteq 3.14(10.0) \\ &\doteq 31.4 \end{aligned}$$

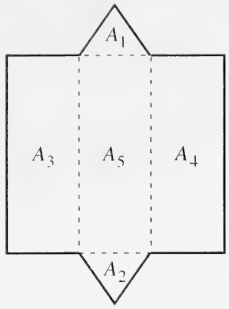
$$\therefore A_2 = 78.5$$

and

$$\begin{aligned} A_1 + A_2 + A_3 &\doteq 78.5 + 78.5 + 376.8 \\ &\doteq 533.8 \end{aligned}$$

The surface area of the cylinder is about 533.8 cm^2. **(2 marks)**

The surface area of the triangular prism is the sum of these areas. **Note:** $A_1 = A_2$, $A_3 = A_4 = A_5$



$$A_1 = \frac{bh}{2}$$
$$= \frac{10.0(8.7)}{2}$$
$$= \frac{87}{2}$$
$$= 43.5$$

$$A_3 = \ell w$$
$$= 12.0(10.0)$$
$$= 120$$

$\therefore\ A_2 = 43.5,\ A_4 = 120,\ A_5 = 120$

and

$$(A_1 + A_2) + (A_3 + A_4 + A_5) = 2(43.5) + 3(120)$$
$$= 87 + 360$$
$$= 447$$

The surface area of the triangular prism is 447 cm^2. **(2 marks)**

5.

$$B = \pi r^2$$
$$\doteq 3.14(1.5)^2$$
$$\doteq 3.14(2.25)$$
$$\doteq 7.065$$

$$V = BH$$
$$\doteq 7.065(5)$$
$$\doteq 35.325$$
$$\doteq 35.3$$

The volume of the log is about 35.3 m^3.

$$B = s^2$$
$$= 2^2$$
$$= 4$$

$$V = BH$$
$$= 4(5)$$
$$= 20$$

The volume of the rectangular prism is 20 m^3.

$$35.3 - 20 = 15.3$$

The volume of the wood scraps is about 15.3 m^3. **(3 marks)**

6. No, the network is not traversable. There are four odd vertices. Traversable networks have either no odd vertices or two odd vertices. **(2 marks)**

7. A minimum of three colours is required. This is one example of how the map may be numbered.

(2 marks)

Part 4: Statistics and Probability (25 marks)

1. Make a list of the possible outcomes.

Product		Spinner B				
		1	**2**	**3**	**4**	**5**
Spinner A	**1**	1	2	3	4	5
	2	2	4	6	8	10
	3	3	6	9	12	15
	4	4	8	12	16	20

a. $\frac{\text{Favourable}}{\text{Possible}} = \frac{1}{20}$

The probability of the product being 1 is $\frac{1}{20}$. **(2 marks)**

b. $\frac{\text{Favourable}}{\text{Possible}} = \frac{8}{20}$

$= \frac{2}{5}$

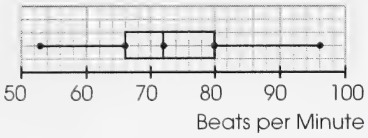
The probability of the product being less than 5 is $\frac{2}{5}$. **(2 marks)**

c. $\frac{\text{Favourable}}{\text{Possible}} = \frac{14}{20}$

$= \frac{7}{10}$

The probability of the product being even is $\frac{7}{10}$. **(2 marks)**

2.



(5 marks)

3. a. $0.08 + 0.16 + 0.10 + 0.06 + 0.07 + 0.09 + 0.25 = 0.81$

$0.81 \div 7 = 0.1116$

The mean volume is about 0.116 parts per million. **(2 marks)**

0.06 0.07 0.08 (0.09) 0.10 0.16 0.25

The median volume is 0.09 parts per million. **(2 marks)**

b. $0.116 \div 2 = 0.058$

The new mean would be 0.058 parts per million. **(2 marks)**

$\frac{0.09}{2} = 0.045$

The new median would be 0.045 parts per million. **(2 marks)**

4. a. The store owner would use the mode because the size that is sold most often would be important when ordering suits. **(2 marks)**

b. The coach would use the mean because the mean is traditionally used to calculate batting averages. **(2 marks)**

c. The teacher would use the median because this statistic is affected less by the inclusion of a significantly higher or lower mark. **(2 marks)**

MATHEMATICS 8

FINAL TEST

GENERAL INSTRUCTIONS

YOU HAVE **TWO** HOURS TO COMPLETE THIS TEST. Work through the entire test answering the questions you are sure you know. You will then be able to concentrate on the questions of which you are not quite sure.

TOTAL MARKS: 100

PART 1: Number	25 marks
PART 2: Patterns and Relations	25 marks
PART 3: Shape and Space	25 marks
PART 4: Statistics and Probability	25 marks

Note: You will need a scientific calculator and a metric ruler for the test.

Value

PART 1: NUMBER

25 **Answer each of the following questions using the space provided. Clearly show how you arrived at your answers.**

(1 mark) **1. a.** Gold can be hammered into sheets as thin as 0.000 102 mm. Write this measurement in scientific notation.

(1 mark) **b.** One second is 1.16×10^{-5} of a day. Write this number in standard form.

(1 mark) **2.** Stainless steel is made of 74 parts of iron, 18 parts of chromium, and 8 parts of nickel. Write the ratio of iron to chromium to nickel in lowest terms.

(2 marks) **3.** The measures of the angles of a right triangle are in the ratio of 1:2:3. Find the measure (in degrees) of each angle.

Name of Student _____	Student I.D. # _____
Name of School _____	Date _____

(2 marks) **4.** Salmon live in the ocean and spawn in freshwater streams. Suppose a female salmon lays 8000 eggs during spawning and only 2.5% of the offspring survive the trip to the ocean. How many offspring survive the trip?

(1 mark) **5.** About $\frac{1}{30}$% of all water on Earth evaporates each year. Express this precent as a fraction.

(2 marks) **6.** A science-store owner makes a 125% profit on telescopes. If the owner paid $60 for a telescope, what is the selling price?

Name of Student _____ Student I.D. # _____

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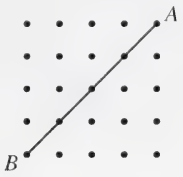
7. Line segment AB is drawn on this dot paper as shown.



(1 mark) **a.** What is the length of line segment AB? Express the answer in square root form.

(1 mark) **b.** Give a decimal approximation (to the nearest hundredth of a unit) for the length of AB.

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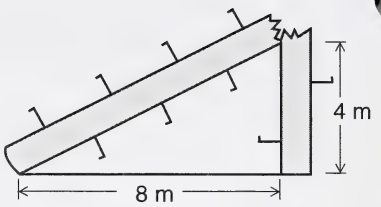
(3 marks)

8. As shown in the diagram, a telephone pole was broken in a storm. What was the height of the pole before it broke? **Note:** Round the answer to the nearest tenth.



(2 marks)

9. After a party, $\frac{2}{3}$ of a cake was left over. If 4 friends shared the left-over cake equally, what fraction of the whole cake did each friend receive?

10. Anna has \$24. Barbara has $\frac{5}{6}$ as much as Anna and Carla has $1\frac{3}{4}$ times as much as Anna.

(2 marks)

a. How much money does Barbara have?

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(2 marks)

b. How much money does Carla have?

(2 marks)

11. Alpha Centauri is $4\frac{1}{3}$ light-years from Earth. Sirius is $8\frac{3}{5}$ light-years from Earth. How much farther from Earth is Sirius than Alpha Centauri?

(2 marks)

12. Over one 24-h period the temperature in Browning, Montana, dropped from 6.7°C to −48.8°C. How much did the temperature change?

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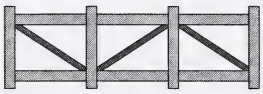
Value

PART 2: PATTERNS AND RELATIONS

25

Answer each of the following questions using the space provided. Clearly show how you arrived at your answers.

1. Frances made a fence using posts and crosspieces. The following chart shows the pattern she used.

Picture	Number of Posts	Number of Crosspieces
	2	3
	3	6
	4	9

(2 marks)

a. How many crosspieces would be needed for a fence with 5 posts? Make a drawing to verify your answer.

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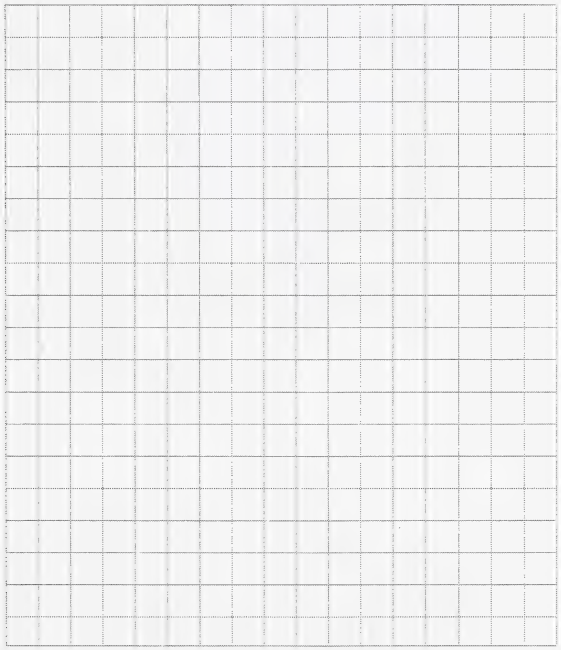
(2 marks)

b. How many crosspieces would be needed for a fence with 6 posts? Make a drawing to verify your answer.

(3 marks)

c. Make a graph showing the relationship between the number of posts and the number of crosspieces.



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(2 marks)

d. Write an equation to show the relationship between the number of posts and the number of crosspieces.

(2 marks)

e. Use the equation to determine how many crosspieces would be needed for a fence with 10 posts.

2. Solve each of the following equations. Then verify your answers.

(2 marks)

a. $\frac{x}{2} = -3$

(2 marks)

b. $5x - 1 = 9$

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(2 marks) c. $\frac{x}{3}+2=-4$

(3 marks) **3.** Joe has 5 sports cards. He buys 3 packs of sports cards with the same number of cards in each pack. If he now has 35 cards altogether, how many cards were in each pack Joe bought?

Solve this problem by writing an equation.

(3 marks) **4.** Hans gave Vera half his candies. She ate seven of the candies that Hans gave her and had 23 candies left. How many candies did Hans start with?

Solve this problem by writing an equation.

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(2 marks)

5. Airlines do not use regular cargo holds to ship pets. That is because the temperature drops as the plane rises and cargo holds are not heated.

You can use the following formula to calculate the temperature in the cargo hold.

$$c = g - \frac{h}{150}$$

In this formula c represents the temperature (in °C) in the cargo hold, g represents the temperature (in °C) on the ground, and h represents the vertical height (in m) of the plane.

If the temperature on the ground is 24°C, what is the temperature in the cargo hold of a plane 1500 m above the ground?

Value

PART 3: SHAPE AND SPACE

25

Answer each of the following questions using the space provided. Clearly show how you arrived at your answers.

1. Calculate the area of each of the following decorative gardens. **Note:** Round each answer to the nearest tenth.

(2 marks)

a. a parallelogram with a base of 14.6 m and a height of 7.2 m

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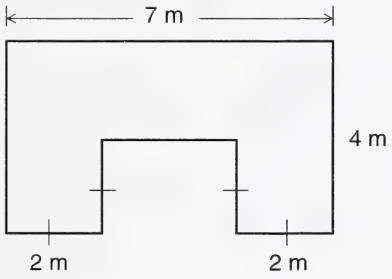
(2 marks) **b.** a trapezoid with a base of 18.1 m, a base of 10.4 m, and a height of 7.1 m

(3 marks) **2.** Calculate the area of the following composite figure.



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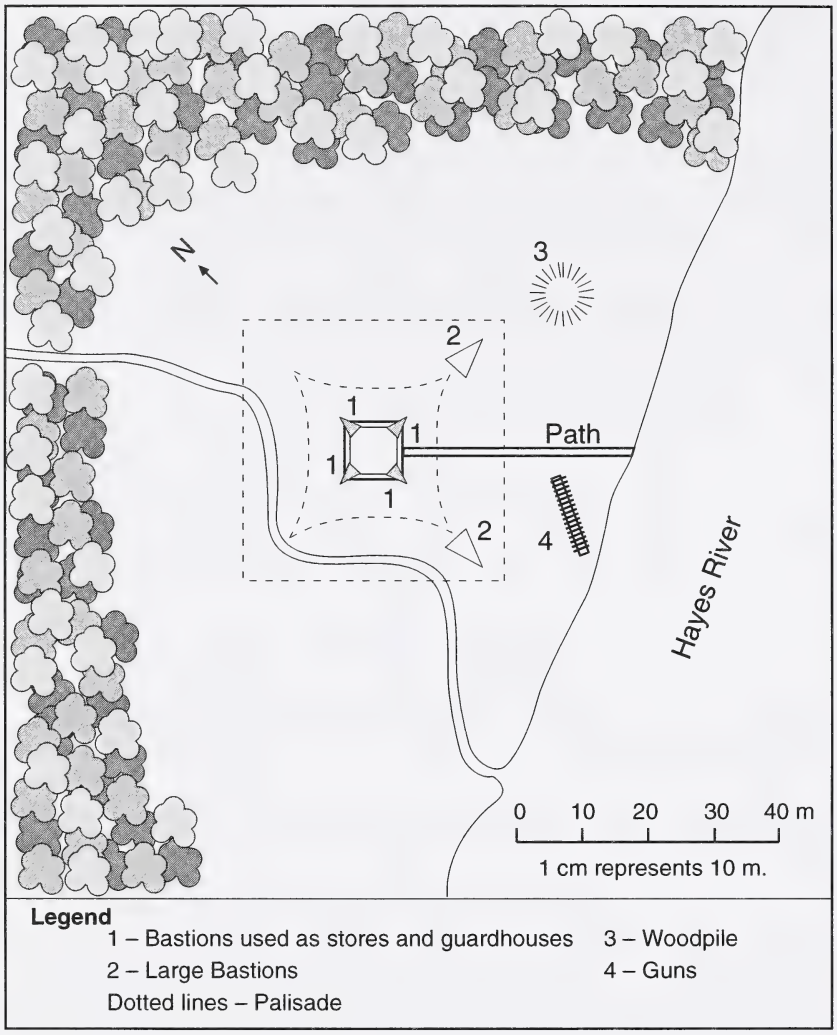
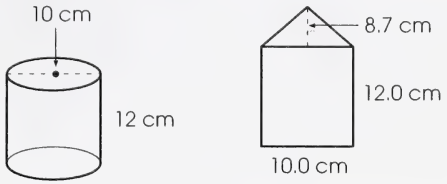
3. Following is a scale drawing of York Factory (about 1750).



(2 marks) Find the perimeter (in metres) of the outer palisade.

Use the following diagrams of two solid containers to answer question 4.



(4 marks) **4. a.** Calculate the volume of each container.

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(4 marks) **b.** Calculate the surface area of each container.

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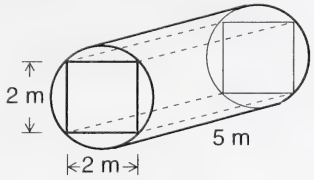
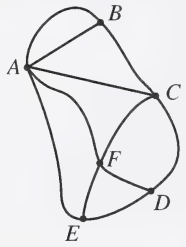
(3 marks) **5.** A rectangular prism is cut from a log with a diameter of 3 m.



What is the volume of the left-over wood scraps? **Note:** Round to the nearest tenth.

(2 marks)

6. The following network is a map of a town. Is it possible to find a route that covers each edge (road) once and only once? In other words, is the network traversable? Explain.



(2 marks)

7. What is the minimum number of colours required to separate the provinces and territories on this map of Canada? Verify your answer by writing 1 for the first colour, 2 for the second colour, … on the map. **Hint:** Start with the Yukon.

The minimum number of colours required is _____.

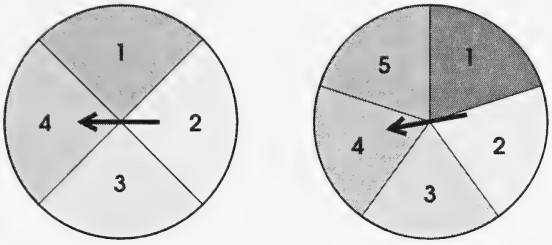
Value

PART 4: STATISTICS AND PROBABILITY

25

Answer each of the following questions using the space provided. Clearly show how you arrived at your answers.

1. A number spun on Spinner A is multiplied by a number spun on Spinner B.



Give the probability of each of the following

(2 marks) **a.** a product of 1

(2 marks) **b.** a product less than 5

(2 marks) **c.** an even product

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2. Following is a stem and leaf plot of the pulse rates (in beats per minute) of 20 students.

Stem	Leaf
5	3, 5
6	1, 2, 6, 6, 8, 8, 9
7	2, 2, 3, 6, 7, 9
8	1, 2
9	1, 3, 6

Make a box and whisker plot of the pulse rates.

(5 marks)

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3. A study of the air pollution in a large Canadian city yielded the following consecutive daily readings of the volume (in parts per million) of sulphur dioxide emissions.

0.08 0.16 0.10 0.06 0.07 0.09 0.25

(4 marks) **a.** What was the mean volume? the median volume?

(4 marks) **b.** Suppose pollution controls caused the volume of sulphur dioxide emissions to be cut in half. What would be the new mean and median?

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4. Explain why each of the following people might select the mean, median, or mode to describe a set of data.

(2 marks) **a.** a store owner deciding what sizes of suits to order

(2 marks) **b.** a baseball coach reporting the team's batting averages

(2 marks) **c.** a teacher reporting the average mark on a test

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Name of School _____	Date _____

TEACHER QUESTIONNAIRE FOR MATHEMATICS 8

This course is designed in a new distance learning format, so we are interested in your responses. Your constructive comments will be greatly appreciated, as future course revisions can then incorporate any necessary improvements.

Teacher's Name _____ Area of Expertise _____

School Name _____ Date _____

Design

1. The modules follow a definite systematic design. Did you find it easy to follow?

   ❑ Yes ❑ No If no, explain.

   _____

   _____

2. Did your observations reveal that the students found the design easy to follow?

   ❑ Yes ❑ No If no, explain.

   _____

   _____

3. Did you find the Learning Facilitator's Manual helpful?

   ❑ Yes ❑ No If no, explain.

   _____

   _____

4. Part of the design involves stating the objectives in student terms. Did you find this helped the students understand what they were going to learn?

   ❑ Yes ❑ No If no, explain.

   _____

   _____

5. The Learning Facilitator's Manual contains answers to the questions in the Assignment Booklet and a sample test. Did you find these helpful?

❑ Yes ❑ No If no, explain.

_____

_____

6. Did the Follow-up Activities prove to be helpful?

❑ Yes ❑ No If no, explain.

_____

_____

7. Were students motivated to try these Follow-up Activities?

❑ Yes ❑ No If no, give details.

_____

_____

8. Suggestions for computer and video activities are included in the course. Were your students able to use these activities?

❑ Yes ❑ No Comment on the lines below.

_____

_____

9. Were the assignments appropriate?

❑ Yes ❑ No If no, give details.

_____

_____

10. Did you fax assignments? ❑ Yes ❑ No

11. If you did fax, did you get satisfactory results from using this procedure?

❑ Yes ❑ No If no, give details.

_____

_____

Instruction

1. Did you find the instruction clear?

   ❑ Yes ❑ No If no, give details.

   _____

   _____

2. Did your observations reveal that the students found the instruction interesting?

   ❑ Yes ❑ No If no, give details.

   _____

   _____

3. Did you find the instruction adequate?

   ❑ Yes ❑ No If no, give details.

   _____

   _____

4. Was the reading level appropriate?

   ❑ Yes ❑ No If no, give details.

   _____

   _____

5. Was the work load adequate?

   ❑ Yes ❑ No If no, give details.

   _____

   _____

6. Was the content accurate and current?

   ❑ Yes ❑ No If no, give details.

   _____

   _____

7. Did the content flow consistently and logically?

❑ Yes ❑ No If no, give details.

_____

_____

8. Was the transition between booklets smooth?

❑ Yes ❑ No If no, give details.

_____

_____

9. Was the transition between print and media smooth?

❑ Yes ❑ No If no, give details.

_____

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Additional Comments

_____

_____

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Thanks for taking the time to complete this questionnaire. Your feedback is important to us. Please return this questionnaire to the address on the right.

Fax Number: 674-6561

Instructional Design and Development
Learning Technologies Branch
Box 4000
Barrhead, Alberta
T7N 1P4

Note: Please ensure that each of your students has completed and forwarded a copy of the Course Survey.

MATHEMATICS 8

LEARNING FACILITATOR'S MANUAL

Distance Learning

Alberta EDUCATION

Modules 1–6